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Mining and Metallurgical Society *of* America

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Mining and Metallurgical Society *of* America

Vol. VI January 31, 1913. No. 1

ANNOUNCEMENTS.

San Francisco Section.—Regular meetings of the San Francisco section will be held on the first Monday of February and May, 1913. Other meetings may be held on call of the chairman.

New York Section.—A meeting of the New York section will be held at 8 p.m. on February 13, at the Chemists' Club, preceded by a dinner (informal) at 6.30 p.m. The subject for discussion will be the new mining regulations of Mexico, which have been translated by E. L. Dufourcq, and are published elsewhere in this bulletin.

W. R. Ingalls,
Secretary.

COUNCIL

A meeting of the council was held at the Engineers' Club, New York, on Jan. 14 at 12.30 p.m. The members present in person were Messrs. Channing, Chance, Finlay, Garrison, Ingalls and Munroe. Mr. Leggett was represented by Mr. Ingalls by proxy.

The President of the Society occupied the chair. He stated that the minutes of the meeting of the council on Dec. 19 had been sent to all members of the council and would be declared approved if no objections were offered. No objections having been offered the minutes of the meeting on Dec. 19 were declared approved.

The Secretary handed to the President the votes on the council ballot issued on Dec. 23 to be counted on Jan. 14. After inspecting and counting these votes, the President announced that all of the members of the council, 15 in number, had voted in favor of the proposed terms of union of the Society and Institute; and that all of the members of the council had voted in favor of the proposed amendment to the by-laws of the Society, i.e , the cancellation of by-law No. 4.

Upon motion, duly seconded, and unanimously carried, the votes of the council by letter ballot upon both of the above matters were confirmed.

W. R. Ingalls,
Secretary.

THE SOCIETY AND THE INSTITUTE

The plan for a union of the Society and the Institute, adopted by the council of the Society on Jan. 14, 1913, and by the council of the Institute on Jan. 23, 1913, is as follows:

1. The Society to become the Mining and Metallurgical Society of the A. I. M. E., the Society preserving its integrity and organization.

2. The Society to preserve in its insignia the letters M. M. S. A.

3. The Society to continue its studies of professional and professional-political questions through committees and otherwise as at present.

4. The Society to make membership in the Institute a qualification for membership in itself; to abolish the provisions of its constitution and by-laws pertaining to initiation fee, life membership and honorary members; to suspend temporarily its by-law relative to the election of members and permit its executive committee, in conference with the membership committee of the Institute, to elect out of the Institute members meeting the qualifications of the Society, their election to be consummated by the executive committee of the Society, this suspension of the membership by-law of the Society to last for only three months after the date of the union of the Society and the Institute, or for such additional time as the council of the Society may fix.

5. The Society to urge its members who are not members of the Institute to become such. Such members becoming members of the Institute to be exempt from the initiation fee of the Institute. Resignation of membership in the Society with preservation of membership in the Institute to be permitted.

6. The Society to amend its by-laws so as to make its annual dues $20 per member, this to cover the dues of its members as members of the Institute. The Society to pay into the treasury of the Institute $15 per member per year, except as hereinafter stipulated. The Society to retain in its treasury such fund as will be necessary for the award of its annual medal; to accumulate, maintain, and retain an additional surplus of $2,500; the Society to turn over to the Institute all annual surplus over actual expenses and the accumulation and maintenance of the reserves herein specified.

7. The Society to incorporate in its by-laws a provision that $10 shall be deducted from the annual dues of members who are, or may become, life members of the Institute; the

Society to pay into the treasury of the Institute only $5 per annum on account of such members; the Society not to pay anything into the treasury of the Institute on account of members elected during the last three months of a year as dues for that year, or on account of members whose dues to the Institute have already been paid.

8. The Society to manage its own affairs, except in the matter of publishing its proceedings, which publication shall be done by the Institute. The Institute to publish in its bulletin all of the proceedings of the Society as communicated by the officers thereof, the form of such publication to be satisfactory to the council of the Society. The Institute to have the right to republish in its transactions such part of the proceedings of the Society as the governing body of the Institute may desire so to republish. All publications of the Institute to be sent to all members of the Society.

9. The Institute to be the representative organization in all public affairs not involving the action or opinion of the Society; the Society not to be represented in such affairs, except by request of the Institute.

10. The Society and the Institute to avoid duplication of committee work, i.e., if one has appointed any committee, the other shall not appoint a similar committee (except as to internal affairs).

11. The Society and Institute to adjust differences that may arise respecting representation, committee work and meetings of local sections by conference between their respective governing bodies.

12. The Institute and the Society each to make the changes in its constitution and by-laws that may be necessary to carry out the terms of this agreement.

No steps to carry out the above plan have yet been made by either body. In the case of the Society it must of course be submitted to vote of the membership.

ANNUAL MEETING

The annual meeting of the Society was held at the Engineers' Club, New York, on Jan. 14, the first session being called to order by the President, Mr. J. Parke Channing, at 2 p.m. The Secretary presented 86 proxies made out in the names of several persons present, and after inspection of these proxies the President declared that 86 members were present by proxy and 11 in person, a total of 97, this constituting a quorum. Several other members came in later. The members present in person were Messrs. Channing, Chance, Conner, DuBois, Dufourcq, Eurich, Garrison, Huntoon, Ingalls, Munroe, Sanders, Spilsbury, Stoughton, Weed and Westervelt.

The President stated that the minutes of the last previous meeting of the Society, namely, the annual meeting on Jan. 9, 1912, had been printed in Bulletin No. 44 of the Society and would be declared approved as there printed if no objections were offered. No objections having been offered the minutes of the previous meeting were declared approved.

The Secretary and Treasurer presented his reports for 1912. (These reports are printed elsewhere in this Bulletin.) Upon motion, duly seconded, and unanimously carried, the report of the Secretary was accepted and ordered placed on file. Upon motion, duly seconded, and unanimously carried, the report of the Treasurer was accepted and ordered placed on file. Upon motion, duly seconded, and unanimously carried, the Secretary-Treasurer was thanked for his services.

Mr. J. Parke Channing delivered the presidential address.

Messrs. Spilsbury and Huntoon, who had been appointed by the President as tellers to canvass the votes for the election of officers, presented their report. They reported that the ballots and check list of members entitled to vote had been duly delivered to them by the Secretary, as required by the by-laws. The total number of members entitled to vote was 224. The number of ballots received was 137, of which two were rejected because of defects. For the office of president, H. M. Chance received 70 votes; T. H. Leggett, 41; and A. L. Walker, 24. For the office of vice-president, J. R. Finlay received 83 votes; G. C. Stone, 37; and H. M. Chance, 15. For the office of secretary-treasurer, W. R. Ingalls received 123; Robert Peele, 8; and C. H. Fulton, 4 votes.

For councillor in district No. 1-2-3, H. S. Munroe received 54 votes; Pope Yeatman, 52; and H. H. Knox, 17. For councillor in district No. 4-5, R. A. F. Penrose received 50 votes; J. E. Spurr, 39; H. M. Chance, 29; and W. Griffith, 14. For councillor in district No. 11, S. W. Mudd received 75 votes; T. B. Comstock, 23; L. A. Wright, 10; and W. F. Staunton, 9. For councillor in district No. 12, C. W. Goodale received 67; S. A. Easton, 20; J. B. Tyrrell, 18; and R. H. Sales, 12 votes.

The President declared that the officers elected for 1913 were: H. M. Chance, President, J. R. Finlay, Vice-President, W. R. Ingalls, Secretary-Treasurer. He declared also that the councillor elected in district No. 1-2-3 was H. S. Munroe; in district No. 4-5, R. A. F. Penrose; in district No. 11, S. W. Mudd; in district No. 12, C. W. Goodale; each to serve for a term of three years.

The Secretary introduced, in behalf of the council, two amendments to the by-laws of the Society adopted by vote of the council, and endorsed with its approval, as follows:

1. Three months before the annual meeting, the secretary shall send a nomination ballot to each member of the Society in the districts for which new councillors must be elected, with the request that he shall nominate three members, in such manner as the council may direct, as candidates for councillor to represent his district; and shall send a nomination ballot to each member of the Society entitled to vote, with the request that he shall nominate one member for president, one for vice-president and one for secretary. Nominations shall be received for 20 days, when the polls shall be closed and the ballots counted by the Secretary. Sixty days before the annual meeting the Secretary shall issue a ballot, containing in and for each of these districts not less than three names, and for the offices of president, vice-president and secretary, each, not less than three names, which shall be in each case those receiving the largest number of nominating votes. Provided, however, that the ballot may comprise less than three names for any office if less than three persons have been nominated for that office; and, moreover, that persons receiving less than seven votes for an executive office and less than three votes for councillor may be disregarded, and provided further, that no person may stand for more than one office, and when votes are cast for the same person for more than one office he shall be placed on the ballot only for that office for which he has the largest number of votes. The ballot prepared as thus directed shall be mailed to each member of the Society entitled to vote, who may vote for one councillor in each district, having the right to substitute names not on the list, and to cast not over three votes for a single candidate, provided that the total number of votes cast by such member shall not exceed the total number of vacancies to be filled; and who may cast one vote for president, vice-president and secretary, respectively, having the right to substitute names not on the list. The ballot shall be signed, sealed and voted as prescribed in by-law 16.

2. Strike out by-law No. 4, as follows: "There shall be an initiation fee of twenty-five dollars for each new member after the total membership shall have reached two hundred and fifty."

The Secretary moved to adopt the above two amendments to the by-laws. This motion, having been seconded, was unanimously carried.

There being no further business, the meeting was then adjourned.

The evening session was preceded by a dinner at the Engineers' Club, at 7 p.m. The members present were Messrs. Channing, Conner, Peele, DuBois, Parsons, Stone, Sanders, Walker, Huntoon, Leggett, Spilsbury, Riordan, Munroe, Payne, Cowles, Wethey, Weed, Finch, Stoughton, Westervelt, Garrison and Ingalls, with Dr. Ledoux as guest. After dinner, informal addresses were made by Mr. Channing, who described a recent journey through Turkestan and the Caucasus; by Mr. Riordan, who related reminiscences of mining in Nevada; by Mr. Leggett, who related experiences in South Africa and discussed the estimation of ore reserves in mines, pointing out that experience commonly showed the ore bodies in the end prove larger than estimated; and by Mr. Ingalls, who described experimental work in electric zinc smelting and discussed certain theories respecting that subject. The meeting was then adjourned.

W. R. Ingalls,
Secretary.

REPORT OF THE SECRETARY

Membership.—The membership of the Society experienced only a small growth during 1912, the net gain for the year having been only five, against a gain of 42 in 1911 and 24 in 1910. Two members were lost during 1912 by death and six by resignation. The record of the year is summarized in the following table:

Total membership, Jan. 1, 1912	229
Members elected during 1912	13
Died	2
Resigned	6
Gained in the year	5
Total membership, Jan. 1, 1913	234
Candidates now before the Society on List No. 32	1
Applications pending	2

The applications for membership received during 1912 were carefully scrutinized by the executive committee of the council, and after submission of the reports of applicants, passed by the executive committee, to the entire membership of the Society for consideration, the names went before the council for letter ballot, in conformity with the by-law governing election of members. By action of the council during 1912, the previous practice of citing the names of members referred to by applicants merely as referees was abolished, and such persons were caused to become actual endorsers. As a result of the careful scrutiny by the executive committee, no applicant was rejected on letter ballot during 1912.

The members of the Society who died during 1912 were:

E. R. Buckley and W. A. Lathrop. An obituary notice in each case was published in the bulletin of the Society.

Meetings of Sections.—The New York section held nine meetings, the San Francisco section five meetings and the Philadelphia section two meetings during 1912. There was only one general meeting of the Society, viz., the annual meeting in January. We had, therefore, a total of 17 meetings during the year. The general meeting of the Society was devoted to business.

The New York section discussed the subjects of professional ethics, paralysis of mining districts, valuation of mining property, mine taxation, and oil-land legislation. In connection with these discussions, papers of especial interest were read by J. R. Finlay, Prof. H. S. Munroe and Prof. A. W. Grabau, of Columbia University, the latter having been invited to address the section.

The San Francisco section discussed the Panama-Pacific Engineering Congress, governmental assay offices, mining law and oil-land legislation. In connection with these discussions, special papers were presented by Prof. J. F. Newsom on "Chilean Nitrate Deposits"; by A. L. Weil and the Hon. Curtis H. Lindley on proposed legislation concerning the oil industry; and by Mr. George T. Edwards on "The Title of the United States to the Public Lands," Messrs. Weil, Lindley and Edwards having addressed the section by invitation. In the matter of oil-land legislation, the San Francisco section appointed a committee to draw up a set of resolutions. Mr. Requa presented a report in behalf of that committee. The set of resolutions was passed by the San Francisco section and transmitted to the council of the Society, which referred them to the standing committee on mining law. The New York section discussed the San Francisco resolutions and adopted them with certain amendments, which were also referred by the council to the standing committee on mining law. As yet that committee has made no report.

The Philadelphia section discussed miscellaneous subjects at one of its meetings and the paralysis of mining districts at the other.

Committees.—The several standing committees of the Society reported progress during 1912, but the committee on the award of annual medal is the only one that made a formal report. The report of this committee was submitted to the council, which made certain amendments that were accepted by the committee. The report of the committee comprised a series of rules for the award of the proposed medal. The report of the committee, as amended, having been adopted by the council, was referred to the membership of the Society for letter ballot, such a reference having been prescribed in the original resolution by which it was voted to award an annual medal. By this letter ballot the membership of the Society adopted the proposed rules by a large majority.

M. M. S. A. and A. I. M. E.—In the latter part of 1912, the council of the Society received from the governing body of the American Institute of Mining Engineers an invitation to meet a committee appointed by it to discuss the union of the Society and the Institute. The council of the Society instructed the executive committee to meet the committee of five members from the Institute. The joint committee held two meetings and unanimously agreed upon a plan of union. The report of the committee was submitted to the council of the Society and to the governing body of the Institute. It has been adopted by the council of the Society but we have not yet been advised respecting action by the Institute. Pending the exchange of ratifications of the proposed plan, it would be improper to publish the details, but it may be said with no impropriety that it is proposed that the Society shall change its name from Mining and Metallurgical Society of America to the Mining and Metallurgical Society of the American Institute of Mining Engineers, but the Society is to preserve its organization, integrity, and independence.

Bulletin.—The monthly bulletin was published regularly during 1912, and in general was published promptly on or about the last day of each month. This is in accordance with the new plan adopted at the beginning of last year. The bulletin is printed under contract on terms that are reasonable. By action of the council, the office of editor of the Society was created, and Mr. Edward K. Judd was appointed.

Formal Actions.—During 1912 the Society took no formal actions in public matters. The Society was invited to participate in the International Engineering Congress to be held in San Francisco in 1915 in connection with the Panama-Pacific Exposition. Without formally signifying its acceptance of this invitation, expression was made of its interest and of its intention of holding a general meeting in San Francisco at that time.

Conclusion.—The Society finishes the fifth year of its existence with a strong, although not large, membership, an increase in prestige and an excellent financial condition.

W. R. INGALLS,
Secretary.

REPORT OF THE TREASURER

The following report for 1912 is respectfully submitted :

RECEIPTS:

Cash on hand, Jan. 1, 1912	$1,744.41
Rec'd for annual dues, 1911	40.00
" " " " 1912	2,235.00
" " " " 1913	20.00
Exchange	.27
Binding of bulletins	229.25
Badges	135.00
Interest	52.99
Initiation fee, sent by error	25.00
H. S. Munroe (for printing and expressage)	4.55
	$4,486.47

EXPENDITURES:

Printing bulletins, lists, etc	$ 463.33
Salaries of assistants to Secretary-Treasurer	366.00
Stenography and typewriting	520.00
Postage, telegraphing and expressage	105.65
Stationery and office supplies	31.65
Bills paid for section aid*	97.88
Badges	250.00
Binding bulletins	141.50
Bank exchange	3.00
Annual Meeting expense	9.50
Printing for H. S. Munroe	4.30
Initiation fee ret'd	25.00
Cash in bank and on hand	2,465.61
Petty cash on hand	3.05
	$4,486.47

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*Cash paid to N. Y. section, $26.67; to San Francisco section, $71.21.

The assets and liabilities on Jan. 1, 1913, were as follows:

ASSETS:

Cash in bank and on hand, Jan. 1, 1913	$2,465.61
Petty cash on hand	3.05
Furniture and supplies	20.00
Bound volumes unsold	11.25
Dues payable	150.00
Due for badge	5.00
Unsold badges	100.00
	$2,754.91

LIABILITIES:

Payments in advance for annual dues	$ 20.00
" " " " bound volumes	78.00
Payment for life membership	50.00
	$148.00

Assets and liabilities in 1911 and 1912 were as follows:

	Assets	Liabilities	Difference
1911	$1,829.41	$ 72.50	$1,756.91
1912	2,754.91	148.00	2,606.91

The treasurer's report for 1908 will be found on page 52, for 1909 on page 185 of the bulletin; for 1910 on page 7, of Bulletin No. 32; and for 1911, on page 19 of Bulletin No. 44. Gross income and expenses for the first five years of the Society's existence compare as follows:

	1908 (7 mos.)	1909	1910	1911	1912
Gross income	$1,200.00	$1,605.75	$1,880.49	$2,315.00	$2,295.00
Total expenses	691.50	1,068.99	1,543.97	2,013.20	1,600.49
Excess of income	$ 508.50	$ 536.76	$ 336.52	$ 301.80	$ 694.51
Cash bal. on hand	508.50	1,045.26	1,381.78	1,744.41	2,468.66

The following is a more detailed comparison of the receipts and expenditures in 1911 and 1912:

		1911	1912
Cr.	Cash on hand first of year	$1,381.78	$1,744.41
	Annual dues received for 1909	10.00	....
	Annual dues received for 1910	60.00	....
	Annual dues received for 1911	2,235.00	40.00
	Annual dues received for 1912	10.00	2,235.00
	Annual dues received for 1913	....	20.00
	Bound volumes	22.50	229.25
	Badges	10.00	135.00
	Interest	....	52.99
	All other receipts	126.80	29.82
	Total	$3,856.08	$4,486.47

Dr. Printing Bulletins, Lists, etc.	$ 758.73	$ 463.33
Salary of Assistants to Secretary-Treasurer	304.00	366.00
Stenography and typewriting	596.96	520.00
Postage, telegraphing and expressage	136.41	105.65
Stationery and office supplies	97.80	31.65
Section aid	72.64	97.88
Bank exchange	5.51	3.00
Binding	28.75	141.50
Badges	....	250.00
Other expenditures	110.87	38.80
Total expenditures	$2,111.67	$2,017.81
Cash on hand, end of year	1,744.41	2,468.66
	$3,856.08	$4,486.47

The running expenses during 1912 are most clearly stated as follows:

	1912
Printing	$463.33
Salaries	366.00
Stenography and typewriting	520.00
Postage, telegraphing, etc.	105.65
Stationery and office supplies	31.65
Section aid	97.88
Exchange	2.73
Expenses of annual meeting	9.50
Binding bulletins for officers' use	3.75
Total	$1,600.49

While the expenses for 1912 proved to be less than what was estimated at the last annual meeting, there were certain favorable circumstances and a repetition of the same results in 1913 is hardly to be relied upon.

W. R. INGALLS,
Treasurer.

COMMUNICATION

The New Mining Regulations of Mexico.

Translated by Edward L. Dufourcq.

Under date of Oct. 12, 1912, the Secretary of the Department of Fomento of Mexico published the decree of the President issued on Oct. 4, embodying the following Mining Police Regulations for the Safety of Mine Workings.

CHAPTER I.—GENERAL DISPOSITIONS.

Art. 1. The dispositions of these regulations shall apply to the workings of all explorations and exploitation of veins and placers which, according to the mining law of Nov. 25, 1909, belong to the public domain, as well as to the exploitation of coal, in accordance with the provisions of Art. 133 of the said law.

Art. 2. Every mine in exploitation, or group of neighboring mines belonging to one owner, shall employ a graduate mining engineer, who shall be responsible for the exploitations being carried on in accordance with the provisions of these regulations.

In case there should be no graduate mining engineer in the place where the mine is located and the number of workmen therein employed should be less than 50; also in case there is a single owner of various neighboring mines which communicate with each other, forming a single exploitation and the number of workmen employed therein is more than 50 but less than 100, the man in responsible charge may be a practical miner of recognized competence, in the judgment of the Department of Fomento.

Art. 3. Detailed plans of the mines in exploitation shall be kept, both in horizontal projection, oriented to the astronomic meridian, as well as in vertical projection, and on the same shall be shown the new workings, fillings, etc., at least once each month.

Art. 4. A special daily registry book shall be kept showing in detail the personnel which enters and leaves the mine; in this shall be recorded the names of the workmen and the workings in which they are employed, likewise the number of mules and horses which are taken in or out of the mine.

Art. 5. In underground workings of mines, as well as in open-cut workings, the employment of children under 12 years of age is prohibited. To those between 12 and 18 years of age, only such work shall be given as is in proportion to their strength.

Art. 6. The owners of mines in actual operation must keep on hand at the mines medicines and means for first aid to the injured. There must always be employed one or more persons skilled in giving first aid to the injured, asphyxiated, etc., and when the total number of workmen exceeds 100 a surgeon must be employed in addition.

Art. 7. Those in charge of mining work must immediately give advice to the Department of Fomento, by the most rapid means, of any important accident which may occur in the mines, such as caves, floods, fires, explosions, etc.

CHAPTER II.—EXPLORATIONS, EXPLOITATION IN OPEN-CUTS AND UNDERGROUND WORKINGS OF SHALLOW DEPTH.

Art. 8. The mining explorations which are referred to in Art. 124 of the mining law of November 25, 1909, shall be subject to the following provisions:

I. Exploration within private buildings which do not form part of a town and within their dependencies, may only be carried on with the permission of the owner.

II. When explosives are used, exploration work may not be carried on near the precincts of towns except at a distance of at least 50 meters from the exterior lines of every class of building or dependency. The same distance shall be observed in regard to every other public or private work and construction, public roads, railroads and canals. If explosives are not used, the distance above referred to may be reduced to 20 meters.

III. Except in case of borings, excavations which are made for exploration work shall not exceed 10 meters in their greatest dimension.

Art. 9. Open-cut workings cannot be made within 50 meters of public or private constructions, of the public roads, railroads and canals, without obtaining previous authorization of the Department of Fomento.

Art. 10. In order to prosecute underground mining work underneath public or private buildings or other construction, it will first be necessary to submit for the approval of the Department of Fomento a report made by a graduate engineer, in which shall be set forth in detail the precautions which it is proposed to take for assuring the stability of the surface and of the buildings. The Department, in view of such report and of further data which it may be considered necessary to obtain, will grant or refuse the permit.

CHAPTER III.—SHAFTS, OPERATING MACHINERY, TIMBERING, VENTILATION, AND CONNECTIONS WITH FLOODED WORKINGS OR WORKINGS CONTAINING POISONOUS GASES.

Art. 11. Every mine in exploitation must have two separate passages leading to the surface and communicating between them with the stopes in order to facilitate the exit of the workmen in case of accident.

When, due to the extent of the mine and its workings, or on account of the nature of the deposit which is being mined, a greater number of exits communicating with the surface are considered necessary in the judgment of the inspectors, their construction may be required, subject to the approval of the Department of Fomento.

Art. 12. When ladder-ways are established in shafts, the space which they occupy must be separated from the rest of the shaft, as well as from any moving piece of machinery, by means of a division or partition of wood or other convenient material. The ladders in these roadways, and the platforms upon which they rest, must offer sufficient security and must be easy of ascent and descent by the workmen.

Art. 13. In order to avoid accidents, the mouths of the shafts, winzes, ventilating connections, etc., must be properly protected. Protecting rails or fences should prevent access to machinery or moving parts of same. Hoists or other machinery for extraction must be provided with indicators showing the movement of cages, skips, etc.

Art. 14. Whenever hoisting cables or ropes are used for the general transport of the workmen in the mine, means must be employed to protect them from rock or other objects which might fall upon them. Whenever it is possible, the cars or cages in which workmen are hoisted should be supplied with safety appliances to avoid accidents due to the breaking of cables or ropes.

The total weight of men that can be hoisted in cars, cages, etc., in a single trip shall be less than the normal load of rock carried in same, and at the same time the speed of hoisting must be reduced to what is proper, taking into consideration the means used for carrying the men. The hoisting of men and of rock in the same trip will not be permitted.

The man in charge of the mine shall see that daily inspections are made of shafts, cables and machinery, by a competent person, so that same may be continually maintained in good condition and may offer proper security.

Art. 15. Notices in large, clear letters shall be posted in a visible place in the engine house, at the mouth of the shaft and at the entrances of tunnels and of crosscuts, stating the rules and signals for the operation of hoisting machinery. Only those in charge of such operations in the shafts shall be allowed to give orders or signals.

Art. 16. Such places in the mine as appear weak or insecure must be timbered or reinforced in order to avoid the running of loose rock or filling, or the caving of the ground, which might imperil the lives of workmen or the security of buildings.

Art. 17. In all active workings and in passage-ways in use, the air shall be renewed by means of ventilation, either natural or artificial, in such a way that lights will burn well and that the atmosphere shall not be harmful to the health and safety of the workmen. The workings and galleries which ordinarily are not in use, as well as workings which have been abandoned, must be kept shut off so that they cannot be entered without proper authority. In order to regulate ventilation and to shut off dangerous places, doors and gratings shall be installed at proper points.

Art. 18. When it is known that there are bodies of water, which might be dangerous, in the neighborhood of active workings, such workings shall not be advanced except when borings or drill holes in advance of the faces are made under the immediate orders of the man in responsible charge of the mine. Similar means shall be adopted, if necessary, in tunnels which are driven with the object of connecting with flooded workings or workings which are filled with noxious gases.

In the former case, in the workings close to the point where connection is to be effected, chambers must be prepared with the necessary means for the workmen to take refuge therein in case of a flood. The shots must be fired one by one and only after the exit of workmen from levels lower than that of the connection.

CHAPTER IV.—EXPLOSIVES.

Art. 19. The storage, transport and handling of explosives shall be subject to the following provisions:

I. Explosives of different composition shall be stored in separate places, which shall be used exclusively for this purpose and must fulfil the following requirements:

a. Magazines built on the surface must be of light materials, waterproof and poor conductors of heat, with walls of brittle material, and shall be located with respect to each other and with respect to buildings, public roads and railroads, at such a distance as may be considered proper, taking into consideration the maximum quantity and the strength of the explosives which are to be stored. Parapets should be constructed near the magazines on the sides where an explosion might cause damage.

b. For storing explosives, mine workings may be made use of, when these do not communicate with mines in operation and by their location, solidity, ventilation, temperature and dryness, offer the proper security.

c. It shall be prohibited to locate magazines of explosives at a distance of less than 10 meters from electric transmission lines.

d. Magazines shall be under the vigilance of a special employee who must have available means of extinguishing the commencement of a fire; and no repairs shall be made to magazines without first having removed from them every explosive substance.

II. Boxes containing explosives of nitro-glycerine base shall not be piled higher than two meters and shall be so stacked that the cartridges shall remain horizontal.

III. It is forbidden to open boxes of explosives inside the magazines.

IV. Fulminating caps and explosives shall never be carried in the same package, and in their transportation, jars must be avoided.

V. To each working of the mine shall be taken only such quantity of explosives as are needed each day, and what is not used immediately, or is left over, shall be returned to the person in charge of their storage, or shall be kept in boxes, under lock and in a safe place.

VI. Explosives such as powders and preparations of nitroglycerine shall be used in cartridge form and the detonators and fuse shall only be attached to such cartridges immediately before using.

VII. Explosives, detonators and fuses which are supplied to the workmen by the owners of the mine must be in good condition and appropriate to the work for which they are to be used.

VIII. For thawing dynamite cartridges, only an appropriate apparatus may be used; the operation shall be conducted outside the magazines and care shall be taken that it is not accomplished rapidly.

IX. Fuses shall be attached to the caps by the use of pincers, and never putting the cap in the mouth and pressing it with the teeth.

X. The introduction of cartridges into the drill holes and the tamping shall not be effected except with tamping-rods of wood, zinc or copper, avoiding blows as much as possible.

XI. In case of non-explosion of a charge, or of the burning of the explosive without detonating, at least half an hour shall be allowed to elapse before entering the working in question. The same shall be observed when various holes are lighted at one time in a single working and the explosions of all of them are not distinctly heard.

XII. Holes which have not exploded shall not be unloaded, nor shall drill holes which have been left after the charge in them has exploded be further deepened.

CHAPTER V.—COAL MINES.

Art. 20. In exploiting coal mines, in addition to the provisions of the foregoing chapters, the following regulations shall be observed:

Art. 21. In the workings in active operation, a current of air shall be maintained of a velocity not greater than three meters per second and the air shall be supplied so that the atmosphere will not contain more than 0.5 per cent. of carbonic acid nor more than 1.5 per cent. of fire-damp.

When, on account of the nature and quantity of the coal dust, or on account of other local conditions, the proportion of fire-damp could be varied without endangering the safety of the mine, the particular case shall be submitted to the Department of Fomento for study and approval.

Art. 22. The crosscuts which join the headings should not be farther apart than 10 meters, one from the other, and the air should be carried to the faces by means of pipes, brattices, etc., if necessary. All the divisions between the principal headings and the return air courses shall be made of masonry or concrete, and the distributors of air shall be of non-combustible material.

Art. 23. All workmen shall be searched before entering the mine to make certain that they do not carry in dynamite, powder, matches, cigarettes, open lamps or other articles which might produce an explosion, the introduction of which into the mine shall be strictly prohibited.

Art. 24. In coal mines, only safety lamps shall be used, with locks which the workmen cannot open; the use of no sort of ordinary lamp will be allowed, even in the offices or platforms at the mouths of shafts through which air is entering the mine.

Art. 25. For no reason shall the ventilating apparatus be stopped without a written order from the man in charge of the mine, and when it is absolutely necessary to stop the running of such machinery all the workmen shall be made to leave the mine before stopping it. If the ventilating apparatus shall have been stopped for some time, no one shall be allowed to enter the mine before the necessary inspection has been made to determine whether the atmosphere of the mine is dangerous for the workmen.

Art. 26. The fire bosses shall make their rounds at least three hours before the work of each shift commences, examining all the workings with the greatest care, looking for the presence of gas, and they shall mark each place with chalk and special signs wherever there is any danger. They shall also note on a blackboard or slate at the entrance of the mine the places where gas has been found, likewise making note of the same in a book maintained for the purpose by the captain of the mine, who shall daily sign such notes before the shift enters the mine.

Art. 27. Until such time as the Department of Fomento may issue regulations concerning the use of permissible explosives and of detonators appropriate for coal mines, in order to obviate fires and explosions of fire-damp or of coal dust, only such explosives shall be used in the mining of coal which experiments in other countries have demonstrated to be the most appropriate to the nature of the deposit and to the system of mining, provided always that in each case the maximum charge of each explosive shall have been determined.

The drill holes shall always be charged with less explosives than the maximum which is determined and allowed by the Department of Fomento, and in tamping said drill holes no materials shall be used which contain inflammable substances.

Within a period of three months from the date of these regulations, all coal mining companies shall report to the Department of Fomento regarding their explosives, the maximum charges of same and the detonators which they use in their mining work, in order that the Department itself, in view of these reports and of such others as it may judge necessary to obtain, may officially decide whether or not they can be accepted. When it is proposed to use a new explosive in the mining of coal, those responsible for it shall present to the Department of Fomento a report of the experiments which have been made in this regard and in view of these the Department shall or shall not authorize the use of said new explosive.

Art. 28. The methods of mining and transporting which are used in the mine shall be such as to produce the least possible quantity of coal dust, in order that such shall not be carried, to too large an extent, in suspension in the air of the mine, nor shall accumulate in any part of it. All roadways and workings in use shall be sprinkled and frequently cleaned, and such sprinkling shall generally be effected just before the time of firing the blast, in such workings as might be in danger from the effects of the blast to be fired. Firing of blasts shall be done at fixed hours if it is possible, and always when the entire working force shall have left the mine, with the exception of the men firing the holes and the fire bosses.

Art. 29. Of every mine in operation, plans shall be maintained showing the ventilation, on which may be seen clearly and in detail both the general plan of ventilation for the whole mine as well as for all of the workings, and on said plans shall be added at least once a week the new workings opened in the mine.

Art. 30. A special registry book shall be kept for the state and condition of ventilation. In this shall be noted daily, at the same hour if possible, the quantity of air entering the mine per minute, the number of operatives and of horses or mules which are at that time underground, as well as the analyses of the mine air.

Art. 31. All coal mining companies shall maintain rescue crews composed of a sufficient number of fit men. These crews shall be equipped with all that is necessary in the way of apparatus for rescue, but one crew may serve various companies in the same locality.

Chapter VI.—Penalties for Infractions of the Provisions of These Regulations.

Art. 32. In accordance with the provisions of Art. 101 of the mining law now in force, the Department of Fomento may impose for the infringement of these regulations, or of other rules regarding policing and safety of mine workmen, a sentence not to exceed one month in jail or a fine not to exceed 500 pesos, according to the seriousness of the offence.

Chapter VII.—Transitory Articles.

Art. 33. Counting from the date of publication of these Regulations, a period of one year is fixed during which owners of mines which lack the plans mentioned in Arts. 3 and 29 may comply with the provisions of said Articles.

Art. 34. The proprietors of mines which are actually operating without fulfilling the requisites of Art. 11, shall so advise the Department of Fomento within a period of six months counted from the date of these Regulations. At the same time they shall present the projects of the workings which they expect to carry out, in order to comply duly with said Article, noting what length of time in their judgment they will require to complete the same. The Department then, in view of the projects which are presented to it and of other data which it may be deemed convenient to obtain, will definitely fix the time within which said proprietors will be obliged to comply with the provisions of the Article in question.

Art. 35. A period of six months is fixed, counting from the date of these Regulations, in which coal mines must comply with the provisions of Arts. 24 and 31.

Art. 36. Until such time as the Department of Fomento shall issue instructions regarding installations of machinery and of power transmission lines, both underground and on the surface of mines, such installations must offer proper security for the prevention of accidents which might endanger the lives of the operatives.

Art. 37. Such cases as are not provided for in these Regulations shall be decided upon by the Department of Fomento, which will give the inspectors the necessary instructions for properly executing the commissions which may be entrusted to them.

PERSONALS

John M. Boutwell has finished field work on the property of the Detroit Copper Co. at Morenci, Ariz., and has returned to Santa Barbara, Calif., to prepare his report.

Gelasio Caetani will deliver a course of lectures at Harvard University early in February, after which he will go to Europe for a brief stay.

Fred Hellmann has assumed charge of the Guggenheim properties in Chile.

H. C. Hoover has been elected a member of the board of trustees of Leland Stanford University, California.

James F. Kemp has been elected first vice-president of the Geological Society of America for 1913. W. B. Clark is treasurer.

Prof. Kemp has been retained to make a report on asbestos properties in the Eastern Townships, Quebec.

W. S. Mann is superintendent of the reduction works of the N. Y. & Honduras Rosario Co., at San Juancito, Honduras.

Henry M. Payne is now chief of staff of Stephen T. Williams & Staff, Inc.

Mining and Metallurgical Society *of* America

Vol. VI February 28, 1913. No. 2

ANNOUNCEMENTS.

Meeting of the Society.—By order of the President a meeting of the Society is called at the Engineers' Club, New York, on Thursday, March 13, at 8 p.m., the usual 30 days' notice being omitted for reasons of weight, to take further action on the pending amendments to the by-laws that were passed at the last annual meeting of the Society on Jan. 14, 1913. The members not expecting to be present at this meeting are requested to execute the form of proxy sent with this bulletin, making it out in the name of some member who will be present.

New York Section.—The March meeting of the New York section will be held at the Engineers' Club, New York, on Thursday, March 13, at 8:15 p.m. The meeting will be preceded by a dinner (informal) at 6:30 p.m.

San Francisco Section.—Regular meetings of the San Francisco section will be held on the first Monday of May, September and December, 1913. Other meetings may be held on call of the chairman.

Bound Volumes.—Bound volumes of the Bulletin of the Society for 1912 may be obtained from the Secretary for the price of $1.50. Any member desiring a complete set of the bulletins for 1912 unbound can obtain it, free of charge, by application to the Secretary.

W. R. Ingalls,
Secretary.

Ballots.—The President of the Society appointed F. W. Parsons and L. D. Huntoon tellers to count the votes on the resolutions pending before the Society, upon which the polls closed on Feb. 15. The tellers reported as follows:

H. M. Chance,
President.

We beg to report that we have this day canvassed the ballot on resolutions regarding—

Building for the U. S. Bureau of Mines and
Geological Survey, and
Patent Legislation

which were submitted to the membership on Jan. 15.

Ballots were received to the number of 126, of which one was rejected because of lack of signature.

On the first resolution there were 123 votes in the affirmative and two in the negative; and on the second resolution there were 114 votes in the affirmative and seven in the negative; four ballots contained no vote on the second question.

The number of members eligible to vote was 224.

F. W. Parsons,
L. D. Huntoon,
Tellers.

Feb. 15, 1913.

The first question before the Society was the following resolutions:

WHEREAS, The work of the U. S. Geological Survey and of the U. S. Bureau of Mines is seriously hampered by the crowded condition of the buildings occupied by these organizations in Washington, and

WHEREAS, These buildings have neither adequate floor space, proper laboratory facilities, protection of records against fire, nor room for collections, and

WHEREAS, The buildings now occupied are situated in the noisiest part of the city, so that the efficiency of the members of these important bureaus is materially decreased,

RESOLVED, That in the opinion of the Mining and Metallurgical Society of America, these conditions should at once be remedied by the erection of a proper fireproof building, or buildings, to house the two bureaus, and that this building, or these buildings, should be of sufficient size and properly equipped for the needs of these two organizations, which are engaged in work valuable and essential to the mining industry; and that the building, or buildings, erected should be of an architectural design reflecting the importance and dignity of the mining industry.

The majority of the votes cast having been in favor of the above resolutions, I hereby declare them to be adopted as the formal action of the Society.

The second question was upon the following resolutions:

WHEREAS, There are pending before the Congress numerous bills affecting and greatly modifying the patent system in the United States, and

WHEREAS, The patent system has been, and is, a tremendous factor in building up the present industrial prosperity of this country, thereby greatly contributing to the prosperity of the country as a whole, and

WHEREAS, Any untoward change in the patent situation might disastrously affect this condition of industrial and general prosperity, and the conditions contributing to their continual augmentation, and

WHEREAS, In view of the intimate relation of the patent system to the general welfare, no action looking toward any radical change in the patent system should be taken without most careful consideration, and

WHEREAS, In our opinion, proper consideration of such important changes as are proposed can be had only by an unbiased, non-partisan commission, made up of men from various walks of life and not from any one vocation, or interest, BE IT RESOLVED, That the Mining and Metallurgical Society of America, respectfully urges the Congress of the United States that they provide for a Commission, made up of unbiased, independent, nonpartisan men of such national standing as will command the respect of the whole country; and chosen from different walks of life; and not more than one from any one calling or interest; and serving without pay. Such Commission to hold public hearings, and otherwise, as may appear to them best, to make a thorough and careful study of the American patent situation, and to prepare and submit a comprehensive report and recommendations to Congress for such changes, if any, as may, as the result of their study, appear to them expedient, whether in the Patent Office, in the method of court procedure, or in the organic patent law, and recommendations as to the legislation they would propose for effecting said changes. And that we further respectfully urge that the Congress make ample provision for the expenses of said Commission, and

BE IT RESOLVED, That we respectfully urge the Congress of the United States to hold in abeyance all proposed legislation affecting the patent system in whatsoever way until such time as the said Commission shall have had ample opportunity to hold the said hearings, and make the said study and report, and

BE IT FURTHER RESOLVED, that these resolutions be printed and a copy sent to each Senator and Representative of the United States who is a member of the Senate or House Committee on Patents.

The majority of the votes cast having been in favor of the above resolutions, I hereby declare them to be adopted as the formal action of the Society.

H. M. CHANCE,
President.

Feb. 16, 1913.

COUNCIL

A meeting of the council of the Mining and Metallurgical Society, of which notice was given on Jan. 27, was held at the Engineers' Club, New York, on Tuesday, Feb. 11, at 5 p.m. The members present in person were Messrs. Chance, Kemp, Munroe and Ingalls. Dr. Chance held the proxy of Mr. Garrison. The total number of members present in person and by proxy being five, this constituted a quorum.

Dr. Chance, President, occupied the chair. The reading of the minutes of the last previous meeting was dispensed with, these having previously been sent to all members of the council. The President declared that no objection having been received, these minutes would stand approved as previously submitted in manuscript to the members of the council.

Upon motion, duly seconded, and unanimously carried, the following members of the council were elected as the executive committee for 1913: Messrs. Chance, Finlay, Ingalls, Kemp and Munroe.

It was moved and seconded that the executive committee be clothed with all the power of the council, except in the election of new members of the Society, in which it may exercise only its usual functions as prescribed in the by-laws. This motion was unanimously carried.

The Secretary presented the following report received from the chairman of the committee of mining law:

Salt Lake City, Jan. 31, 1913.

To the Secretary
of the Mining and Metallurgical Society,
New York City.

Dear Sir:

Your committee on mining law begs to present through you to the Society the following report on the resolutions adopted by the San Francisco section and on the minority report accompanying the same relative to oil lands:

The committee approves without change sections 1, 2 and 3.

The committee recommends the following as a substitute for section 4:

4. Where two or more individuals or corporations desire to lease the same tract of land the lease shall be allotted by the Secretary upon the basis of competitive bids, the proffers to be in terms of royalty offered, and all royalties to be chargeable and payable in terms of the product. Whenever a lease is thus allotted to a bidder in competition with others it shall consist of such an acreage as shall be fixed in each particular case by the Secretary; but no lease allotted without competitive bidding shall contain more than 320 acres. No allotment shall be made of any lease or leases unless in the opinion of the secretary the individual or corporation acquiring the lease shall be financially able to develop the property completely and to care for it during and after development in the manner best calculated to bring about its greatest production and least waste, with due respect to neighboring properties.

The committee recommends that section 5 be amended as suggested by the New York section of the Society, i. e., by the addition of the following:

The secretary, in making these leases, is empowered, in cases where he thinks it advisable, to substitute for the aforesaid bond of $10,000 either a bond in less amount or an annual rental for the acreage reserved.

The committee approves without change sections 6, 7, 8, 9, and 10.

Respectfully submitted,

HORACE V. WINCHELL,
Chairman.

Supplying the sections referred to by the committee by number, the full set of resolutions recommended by the committee is as follows:

1. There being no laws at present under which oil land can be acquired satisfactorily, a special Federal law should be enacted, governing the acquirement of oil, gas, and asphalt lands, and all lands known or reasonably supposed to contain oil, gas, or asphalt should be disposed of only under the terms of the new law.

2. From time to time as the desirability of maintaining a stable price for oil may in the opinion of the Secretary of Interior demand, oil, gas and asphalt lands now reserved or hereafter withdrawn shall be thrown open to entry in blocks of such size as he shall determine. In fixing the size and position of the blocks, he shall recognize the prin-

ciple that the pioneer may properly be allowed a larger area than the one who follows.

3. Prior to the opening of any lands to entry, they shall be properly surveyed and suitably monumented, and they shall be divided into tracts of 160 acres.

4. Where two or more individuals or corporations desire to lease the same tract of land the lease shall be allotted by the secretary upon the basis of competitive bids, the proffers to be in terms of royalty offered, and all royalties to be chargeable and payable in terms of the product. Whenever a lease is thus allotted to a bidder in competition with others it shall consist of such an acreage as shall be fixed in each particular case by the secretary; but no lease allotted without competitive bidding shall contain more than 320 acres. No allotment shall be made of any lease or leases unless in the opinion of the secretary the individual or corporation acquiring the lease shall be financially able to develop the property completely and to care for it during and after development in the manner best calculated to bring about its greatest production and least waste, with due respect to neighboring properties.

5. Successful entrymen shall file with the secretary a good and sufficient bond to the amount of $10,000 for the faithful performance of the terms of the contract. The secretary in making these leases is empowered, in cases where he thinks it advisable, to substitute for the aforesaid bond of $10,000 either a bond in a less amount or an annual rental for the acreage reserved.

6. Lessees shall commence drilling within a specified and agreed time, and all money expended upon the lease in a bona fide effort to develop oil, gas, or asphalt, or to operate for oil, gas, or asphalt, shall apply to the extinguishment of the bond, and when the total amount so expended equals the amount of bond, the latter shall be cancelled.

7. Transfer of leases shall be valid only upon approval whenever in his judgment such transfer would be contrary to public interest; but he shall not use this power of refusal as a means to exact increased royalty.

8. The lessee shall drill each year an agreed number of wells or shall keep in operation an agreed number of strings of tools unless the local price of oil falls below a certain agreed price. If the lessee forfeits a lease, he shall retain his rights in all wells already drilled and may continue to produce from them so long as he pays the agreed royalty, and forfeited leases shall be immediately open to reletting; provided no drilling shall be done within 300 ft. of an existing well.

9. Line wells must be drilled last except where it is necessary to protect a lease against adverse drilling.

10. Net revenue from leasing the oil lands should go in large part to the state within which the lands are situated.

The Society has before it a set of resolutions adopted by the San Francisco section, together with a minority report submitted by Mark L. Requa (see pp. 168-169, bulletin No. 53, Oct. 31, 1912). Also a set of resolutions adopted by the New York section, which are in the main the same as the San Francisco resolutions but differ in certain particulars (see bulletin No. 54, Nov. 30, 1912). These resolutions having been forwarded to the council were by it referred to the standing committee on mining law, the report of which is now before the council. The council will act in this contingency according to article No. 3 of "Rules Governing Resolutions," which is as follows:

If the council receives resolutions bearing upon the same subject from two or more local sections, the council shall select for submission to the Society that which in its opinion is the most adequate for the purpose intended; or the council may frame a composite resolution, to which new matter may be added, and shall submit such resolution to the membership of the Society as a resolution proposed by the council in lieu of those adopted by two or more local sections.

Upon motion, duly seconded, and unanimously carried, the report of the committee on mining law was ordered to be placed on file and the Secretary was instructed to enter the report in full in the minutes of the council, and request all members of the council to communicate their views respecting the committee's report as a guide toward action at a subsequent meeting of the council.

The Secretary reported receipt of a communication from the president and executive committee of the Twelfth International Congress of Geology inviting the Mining and Metallurgical Society of America to send a delegation to the meeting which will take place in Canada in August, 1913.

Upon motion, duly seconded, and unanimously carried, the invitation of the Twelfth International Congress of Geology was accepted, and Messrs. Kemp, Lindgren and Winchell were elected a delegation of three members to that congress and the President of the Society was empowered to fill any vacancy occurring in this delegation.

There being no further business the meeting was then adjourned.

W. R. INGALLS,
Secretary.

COMMUNICATIONS

The Society and the Institute.

W. R. Ingalls.—Some expressions in discussion of the plan of union of the Society and the Institute at the February meeting of the New York section manifest more or less misunderstanding respecting what is intended and what is the present position of the Society. Professor Munroe at that meeting replied adequately to much of the criticism of the proposed plan, but some further explanation will undoubtedly be useful in clarifying ideas. The following is from the minutes of the meeting of the council of the Society on Dec. 19, 1912:

> In the discussion of the report, the opinions expressed at the meeting were unanimously favorable. Upon motion, duly seconded, and unanimously carried, it was voted that the report of the executive committee be recorded in the minutes of the council, and that it be noted in the minutes that it was the sense of the meeting that the proposed

plan of union with the American Institute of Mining Engineers should be adopted. In view of the importance of the matter, the President directed that the proposed memorandum of terms of agreement be referred to the entire council for letter ballot, vote to be canvassed on Jan. 14, 1913.

In explanation of certain of the provisions of the plan above reported, the Secretary offered the following comments:

"In respect to section 4, no member of the Society has paid an initiation fee, wherefore there will be no unfairness in abolishing the provision for such. The proposed temporary suspension of the membership by-law is to enable desirable members of the Institute to come into the Society upon a footing analogous to that of charter members of the Society, many of these members of the Institute having been invited to join the Society at the time of its organization.

"In respect to section 5, out of the 237 members of the Society there are only 16 who are not already members of the Institute.

"In respect to section 6, the annual dues paid by members of the Society will be simply what they pay now, except in the case of the 16 members who are not members of the Institute. According to section 6 the Society guarantees to the Institute the collection of its present dues and pays $5 per member per year additional to cover services the Institute will perform for the Society. The Society will maintain funds sufficient to enable it to carry out all present plans and to have a reasonably free hand in inaugurating new plans. Any surplus will go into the treasury of the Institute. The amount of such surplus will depend, of course, upon the number of accessions to the membership of the Society. It is expected that these will be important; the whole plan is, of course, based upon that expectation.

"In respect to section 9, it is contemplated that when representation of the mining profession in social, educational and honorary affairs, such for example as the conservation conference in Washington, the engineering congress at the Panama-Pacific Exposition, etc., is invited, the Institute shall be the representative organization. If, however, the expression of the opinion of the membership as a body is required, which can not constitutionally be done by the Institute, the Society may be represented.

"The other sections of the memorandum of agreement ought not to require any special explanation."

Referring to remarks made at the last meeting of the New York section, so far as I know there has been no desire expressed on the part of the Institute to get the Society out of the way, but only a desire to restore or create unity of effort, endeavor and interest. When the proposals looking toward the union of the Society and the Institute were in discussion in 1911, the negotiations terminated by the refusal of the council of the Society to consider anything sacrificing the independence, integrity and organization of the Society. Last fall the responsible officers of the Institute informed us that they would like to reopen negotiations with this point, viz., the integrity of the Society, conceded. The plan of union now before us is essentially the plan proposed by the executive committee of the Society, modified but slightly to meet ideas of the committee representing the Institute. The plan now before us has been approved unanimously by the council of the Society, all of the 15 members having voted for it after deliberate consideration.

The Society is not going to turn over to the Institute its present surplus, but only the surplus after a reserve fund has been accumulated, large enough for any needs that can be foreseen. Even so, the Society has a perfectly free hand in conducting its own affairs and can spend, if it wants to, its total income, wherefore there may be no surplus to turn over to the Institute. In passing, let it be said right here that the ability of the Society to accumulate a respectable surplus out of small dues paid by a small membership results from the fact that the Society has never had to pay any salary to officers, no office rent, and has escaped some other things. It must be perfectly obvious that this condition of affairs cannot run on indefinitely.

Referring furthermore to objections to the plan of union that were made at the last meeting of the New York Section:

No member of the Society who is not already a member of the Institute is going to be forced to join the Institute. Their status remains unchanged and their rights are amply guarded.

The Society entrusts its publishing to the Institute, but it is stipulated that its proceedings *must* be published as submitted and in a form satisfactory to the Society.

The Society does indeed collect and guarantee the Institute dues of its members. The committee was of the opinion that most members would rather settle their dues by one payment than by two; also that a single payment is in accord with the idea of union that is to be effected; moreover that the collection of the dues by the Society insures that its members will remain members of the Institute, membership in which is to be a qualification for membership in the Society. The collection of dues by the Society will prevent a candidate from joining the Institute in order to qualify and dropping out of the Institute after one year.

The payment by the Society to the Institute of a proportion of its dues, in fact $5 per member per annum, is not a gift to the Institute nor a contribution to relieve its financial necessities, but is to pay for the publishing, etc., that the Institute is to do for the Society. No one at present can say what the cost to the Institute of this additional publishing is going to be. The allowance of $5 per member per annum was considered fair by both parties.

The financial arrangement of the plan of union is elastic and consequently meets all of the contingencies that are foreseen and will probably meet all that are unforeseen. An increased membership is expected, and it is proper that the Institute as well as the Society should derive benefit from this. However, the Society does not pay over any surplus until it has met all of its own requirements and the maintenance of a substantial surplus provides it always with immediate funds for any reasonable undertakings. The Society does not even take any risk in the guarantee of dues to the Institute, inasmuch as any loss in that way would simply mean less surplus to be paid to the Institute later on.

Certainly there is no sacrifice of the independence of the Society in any of this. The only limitation imposed upon the Society in fact is the stipulation that it shall not be represented in public functions that do not involve formal action by the membership. In such an affair as the Panama-Pacific Exposition, for example, the representation of one mining organization is sufficient. The existence of two having claims to recognition may create embarrassments; in fact, has done so in certain cases. In such matters the Society may well retire in favor of the Institute, which is the older and larger organization. The Society is in no way limited as to representation in conferences, conventions, hearings, etc., requiring its collective expression of opinion.

The above is probably a sufficient explanation of details. The main question is why such a plan should be under consideration at all.

The causes which led to the organization of the Society by men who were almost without exception members of the Institute were associated with the causes that created dissatisfaction in the Institute among hundreds of its members who did not join the Society. Since that time the Institute has been following the lead of the Society both in precepts and practices. To-day there is not a single thing for which the Society stands that is not accepted in principle or practice, or both, by the Institute. The reformation of the Institute was completed at its last annual meeting.

This being so, it was logical to invite the Society to rejoin the Institute, but the council of the Society has never been willing to recommend its members to take such a step in any way that would not preserve the identity and organization of the Society. When the Society was organized ample opportunity was offered the administration of the Institute to keep the Society in its arms, as an individual organization, it is true, but closely tied to its parent. This opportunity was summarily rejected, and the Society was turned out to shift for itself. How it has done does not need to be retold, but the achievements that it has accomplished, the name that it has made for itself, the prestige that it has won, in short its success, attained by loyalty, hard work and a good deal of self-sacrifice, make most of us feel that we will not now let all of this go for nothing, will not give up our name and organization, forget our history and disappear; the validity of which feeling is recognized by the present leaders of the Institute.

Besides restoring unanimity of interest and effort, which is desirable, a union of the Society with the Institute will remove several difficulties. The Society has consistently aimed to avoid rivalry with the Institute, among other things, to refrain from publishing technical papers, leaving that special activity to the Institute, but it has become increasingly difficult to draw this line. Another thing is the matter of meetings of local sections since these have been inaugurated by the Institute. Two monthly meetings are too much, and members go to one or the other, naturally choosing the one they like the better and naturally producing some pique in the neglected quarter. Many of the meetings and discussions of the Society can be thrown open to members of the Institute with profit on both sides. Finally there is plenty of opportunity for jealousy in the matter of representation in public affairs. Thus, in connection with the engineering congress in San Francisco, in 1915, in which the Society and the Institute have both been invited to participate, the council of the Society has not yet seen what it can do that will not substantially duplicate the work of the Institute. The sight of two general societies representing one country, each reviewing the state of the professional art, would be inappropriate, to say the least.

I shall not in this communication point out what the Institute will gain from the proposed union. The advantages accruing to it will be fully as great as to the Society. The Society will gain, we believe, an accession to its membership that will make it much more fully representative, will command a far broader audience, will gain from the abolition of the present division of interest and will no doubt gain in administrative ability as I shall point out.

Let it be clearly understood that the plan that has been adopted unanimously by the council of the Society contemplates *union* with the Institute, not merely *affiliation*. Union in this case means marriage. Affiliation does not mean anything in particular, anyway nothing more than boarding with the other party so long as his accommodations suit. The preservation of that kind of independence may appeal to some of our members, but are they willing to pay for it to the extent of a doubling or a trebling of their dues? It will boil down to just about that.

A small society can not be run forever on a small annual contribution, and the conditions that have enabled the Mining and Metallurgical Society to do so well financially during the days of its infancy can not be expected to continue indefinitely. After the consummation of the union that is now projected I hope that we shall go further and unite with the Institute in the election of a secretary and a direction of the joint administrative details from the offices of the Institute, a result that would be possible of attainment in the person of the present secretary of the Institute, who is an honored and interested member of the Society.

The New Mining Regulations of Mexico.

Edward L. Dufourcq.—The following explanations and notes should have been published along with my translation of the new Mexican mining regulations, published in bulletin No. 56. It seemed to me that these regulations might be of interest to the members of the Society, for discussion. In presenting them for insertion in the proceedings of the Society, I may state that I have prepared the same publication in a Denver mining publication (*Mining Science*), but that publication understands that they are to be presented also to our Society for discussion.

I have not submitted to *Mining Science* any remarks or discussion of my own concerning these mining regulations, but simply a translation of the Mexican law as published by the Department of Fomento. To bring out, however, some discussion on the part of the members of our Society I may add the following remarks regarding these regulations.

In the first place in making the translation I have endeavored as far as possible to adhere to the literal meaning of the original Spanish, even where some ambiguity has resulted. In some cases, even the original Spanish is not clear in its meaning. The following criticisms of the regulations will occur to anyone, perhaps even from a most cursory examination of them.

For instance in Chapter II, Article 8-III, the limits set for the dimensions of explorations (10 meters) are evidently too small, although in the Mexican mining law it is understood by the word "Explorations" that these are prospecting holes made on claims to which title has not yet been issued.

In Chapter III, Article 12, it would seem unnecessary, arbitrarily to require ladder-ways to be separated from hoist-ways indiscriminately, without distinction of importance, size, character or depth of the shaft in question.

In Article 12 of the same chapter the original Spanish does not make quite clear whether it is the ropes and cables, or the men only, that are to be protected from rocks or other falling objects.

In reference to Chapter III, Article 16, it would seem that while issuing new police regulations for mine operations, a general code or system of hoist signals might have been adopted for the whole country with a provision for same being put in force within a specified time.

In Chapter IV, Article 19—I-a, the specifications as to construction of powder magazines either should have gone further into detail or else these details should have been left to the judgment of the mining inspectors to be decided upon as local conditions demand.

In regard to Chapter V, the regulations of coal mining operations might better, in my opinion, have been made very much more general and have provided for the appointment of commissioners or inspectors for the various coal mining districts, to whom could have been given authority to issue and enforce detailed regulations for their districts, presuming that commissioners or inspectors would be appointed who would be thoroughly familiar with the mining work in their respective districts.

Outside of the criticisms which I have made above, it seems to me that in a general way the issuing of these regulations has been a decided step in advance on the part of the Mexican Government. It is to be hoped that a proper choice of inspectors will be made for the purpose of attending to the enforcement of the law, although it would seem that the limited number of men available in Mexico, who would be conversant with varying mining practice and with the necessity for interpreting the law in view of modifications required by different localities, will be the stumbling block in the way of having a sufficient number of proper inspectors appointed.

I trust that there will be some means of bringing up the discussion of these mining regulations by the Society, and that it will prove of interest to the members at large.

MEETINGS OF SECTIONS

NEW YORK

MEETING OF DECEMBER 19, 1912

A meeting of the New York section was held, after an informal dinner at the Chemists' Club, on Thursday, Dec. 19, at 8.30 p.m. The meeting was called to order by the chairman, Mr. Stone. In the absence of the secretary, F. F. Sharpless was appointed secretary of the meeting.

Those present were: R. M. Catlin, H. M. Chance, A. H. Cowles, H. W. DuBois, E. L. Defourcq, W. R. Ingalls, J. F. Kemp, H. H. Knox, H. S. Munroe, J. A. Van Mater, W. A. Pomeroy, F. W. Parsons, F. F. Sharpless, E. G. Spilsbury, G. C. Stone, W. Y. Westervelt, J. F. Kemp and guest, Prof. A. W. Grabau, of Columbia University.

The Chairman.—As the minutes of the last meeting have been published in the Bulletin, unless there is some objection we shall accept them as they were printed. No objections.

The Chairman.—Prof. Grabau has been kind enough to come here this evening, to talk to us on salt deposits.

The Origin of Salt Deposits with Special Reference to the Siluric Salt Deposits of North America.

By Amadeus W. Grabau.

The Source of Salt.—The ultimate source of extensive deposits of sodium chloride is probably always the sea, but the method of abstraction from the sea water, under natural conditions, varies with the variation of these conditions. In all cases it is true that a relative dryness of climate is a necessary prerequisite, in consequence of which we find modern saline deposits either within the desert belt of the earth, i.e., the trade wind region, or where local conditions have changed the westerly or other winds from moist to drying winds.

Separation by Complete Evaporation.—Complete evaporation of a cut-off portion of the sea is probably the simplest method of producing salt deposits. The salt pans along the coasts of the Red, the Black, and the Caspian Seas, as well as elsewhere along the modern sea coast, furnish illustrations of this method of derivation. Where the composition of the supplying body is that of normal sea water, evaporation results in the deposition of gypsum, followed by sodium chloride and later the rarer salts. Ordinarily the shallow pans receive only a thin deposit of salt, for, since sea water contains only 35 grams of solid salts per liter, of which only 77.76 per cent, or 27.213 grams, are NaCl, it is apparent that only a thin layer can form at one time. Thus a basin containing an area of 100 square kilometers, and a depth of water of 1 meter, would, on evaporation, produce 2,721,300 metric tons of salt. This, with a specific gravity of 2.17, would give 1,254,055.3 cubic meters of salt which, when spread over the entire area of 100 square kilometers, would make a layer 12.5 millimeters thick. If the salt pan were 100 meters deep, the layer would be 1.254 meters deep. If this amount were, however, concentrated in the center of the area, where it would cover 10 square kilometers, it would form a deposit 12.54 meters thick.

If we roughly estimate the area of the late Niagaran sea in North America, before evaporation, to have been 3,240,000 square kilometers and the average depth of the water 100 meters, we have a volume of water of 324 times 10^{12} cubic meters. With 1 cubic meter of sea water containing 27,213 grams of NaCl, this would give 8,817.012 times 10^{12} kilograms, or 8.817012 times 10^{12} metric tons of salt. With the specific gravity of 2.17, there would be 4,063,139,170,500 cubic meters of salt, which, as before, would make a depth of 1.254 meters over the entire area, but if concentrated over the area now occupied by the salt-bearing region of the Salina, roughly estimated at 200,000 square kilometers, it would leave a salt bed a little over 20.3 meters thick. It is, however, evident that the size of the sea which, by evaporation, yielded the first salt had much less area than 3.24 times 10^6 square kilometers, which would be that of a sea extending approximately from eastern New York to western Iowa and from the mouth of the Ohio to Hudson Bay. Indeed, there is reason for believing that there was not more than half this area of water which evaporated to furnish the first salt deposits. Schuchert in his Palaeo-geographic maps of Salina time makes the area less than one-sixth that stated above, or about 500,000 square kilometers. Thus a bed only about 3.3 meters thick would be formed by the evaporation of the water and the deposition of the salt over the area where it is now found.

It is evident that a single water body is insufficient to furnish, by evaporation, the salt of the Salina group. Such an evaporation might indeed have furnished the salt for the oldest of the salt beds shown in the well sections of the Detroit regions, where a bed of pure rock salt about 160 ft. thick rests upon what seems to be Upper Niagaran. If this salt bed represents the final evaporation of the residual Niagaran sea, as seems to be the case, it appears that this deposition was restricted to the deepest basin, that of Michigan, for eastward in New York the series begins with clastic sediments throughout. In general it is the red Vernon shale which underlies the salt of New York, and this shale is best interpreted as a sub-aërial deposit, preceding the deposition of the salt of New York, though probably later than the lowest salt bed of Michigan.

As we have seen, the salt in the waters of an enclosed Salina sea was insufficient to furnish the salt deposits of the Salina area, though it might readily have formed the lowest salt layers of the Michigan area. If this bed was formed by complete evaporation, it should be highly probable that some of the rarer potash salts would be found associated with it, for these are the last to crystallize out on the complete drying of the old sea basin, and evaporation of the mother liquor. For all the later salt deposits, however, an additional supply of sea water would be needed, and this could be supplied to the basin in two ways; either by refilling after complete evaporation and deposition of the salts, through a renewed incursion of the sea, or by a constant supply of sea water from a neighboring ocean, across a barely submerged bar. As an illustration of the first method we might imagine what would happen should the sea again fill the basin of the Colorado desert in Southern California. This basin is believed to be a portion of the head of the Gulf of California cut off by the building of the Colorado delta, and dried up under the influence of the westerly winds which have been deprived of moisture in passing across the high coast ranges. During the earlier stages, while the Colorado discharged into the depression, the level of the water actually rose, as shown by old strand lines situated about 40 ft. above the present sea level. As a result, the water in the basin became fresher, this being shown by the abundance of fresh and brackish water molluscs along the old shores.* The center of the Salton-sink is occupied at present by the Salton sea, enlarged by a recent partial flooding by the Colorado (1905 and 1906). The bottom of the Salton sea is 273.5 ft. below sea level;† its depth on Dec. 31, 1908, was 67.5 ft. and its area about 443 square miles. Previous to the recent submergence, the shores of the much smaller lake were encrusted with recent salt deposits and salt was obtained in commercial quantities. It is, however, expected that in 8 or 10 years the water of the present lake will have again evaporated, when a dry or nearly dry basin will once more exist. The salt of the sea water which formerly occupied this basin should form a layer of a few meters in thickness under the Salton sea (though part of it may be redissolved) and on the evaporation of the present lake, will probably be found covered with detrital sediments.‡

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* Sterns, R. E. C. *Am. Nat.*, Vol. XIII, pp. 141-154, 1879.

† Freeman and Bolster, Water Supply Paper No. 249, U. S. Geol. Surv., p. 19.

‡ If we estimate the area of the Colorado desert roughly at 20,000 square kilometers, probably an excessive estimate, and the average

Should the sea refill the Colorado desert basin, a second deposit of salt of similar thickness would form over the first, this salt being preceded and accompanied by its usual beds of gypsum, and if complete evaporation takes place, by the deposit of an upper series of beds of the potash salts. In this manner deposits of salts could be formed, which with the intervening clastics would be limited in thickness only by the depth of the basin. Subsidence of the land and continued upbuilding of the Colorado delta would practically make it possible for deposits of almost unlimited thickness to be formed.

Several facts are to be considered in this method of salt deposition, as forming crucial test points for the application of this theory to the elucidation of the origin of an older salt deposit. These are: *First,* complete evaporation of sea water furnishes a normal succession of deposits, beginning with gypsum, followed by the sodium chloride and ending with the potash salts. These latter might, in some circumstances, be removed under the influence of the winds. *Second,* later deposits should be separated from the first by layers of detrital sediment, for it is inconceivable that a flooding of a desert area by the sea should be unaccompanied by a great spread of clastic material over the entire area flooded. *Third,* with the incursion of the sea into this area, the life of the outer oceans will also enter the enclosed basin, to exist for a while, until the connection is broken and evaporation again renders the waters too saline for the existence of these organisms. Long before evaporation has proceeded far enough to deposit the salt these organisms are killed off and their preservable remains become embedded in the clastic strata forming at the bottom of the enclosed basin. Thus the dividing clastic layers would also be fossiliferous. *Fourth,* the sea being near enough to flood the basin at intervals, contemporaneous marine deposits, carrying the remains of the normal marine fauna, which also characterizes the clastic beds between the salt layers, are formed within a comparatively short distance of the salt deposits.

Application to the Salina Salt Deposit.—Applying these criteria to the Salina deposits of eastern North America, we find first, that while gypsum and salt occur in alternating layers, there is a notable absence of the potash salts, such as characterizes the

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depth at 60 meters, we would get a volume of water of 120 times 10^{10} cubic meters, which with a total of 27,213 grams of NaCl per cubic meter, would give 3,256.56 times 10^{10} kilograms of NaCl, which with a specific gravity of 2.17 would give 15,048,660,000 cubic meters of NaCl. If this were distributed over the area of the Salton sea, approximately 1,200 square kilometers, it would give a layer a little more than 12.5 meters thick.

great Zechstein salt deposits of North Germany. Second, the characteristic separating layers are found as a rule, but, third, they are entirely unfossiliferous, these Salina deposits being noted for their barrenness of organic remains. Finally, fourth, there are no undoubted marine equivalent deposits carrying the normal oceanic fauna of the time anywhere within reach of the salt deposits. Schuchert, it is true, draws a connection with the Atlantic across northern New Jersey and southeastern New York. But it is here that the clastic deposits are thickest, and so there must have been a broad land area still farther east from which the material composing these beds was derived.

It is thus evident that this mode of formation of salt deposits is not applicable to the Salina deposits of North America.

The Bar Theory of Separation.—The second method by which salt is extracted from sea water is continuous evaporation, with regular and constant supply of sea water, so that, when the brine is saturated sufficiently, deposition of salt goes on while a constant supply of water is kept up across the bar which separates the salt basin from the open sea or other saline body of water. No modern example is known in which the concentration is high enough to deposit salt, but the Kara Bugas Gulf, off the eastern border of the Caspian Sea, with a salinity of 285 per mille (i. e., 285 grams per liter of water) deposits sulphate of magnesia, there being a marked absence of calcium in the Caspian waters and hence Epsom salts replace the gypsum.* The Kara Bugas Gulf (also called the Scythian Gulf) has been taken as a typical illustration of this method of salt deposition, which was elaborated by Ochsenius, and commonly goes under the name of the bar theory of salt deposition. It is easy to see that with an increase in evaporation, or a decrease of supply of additional water, the salinity might rise sufficiently to permit the deposition of common salt. But here again we are confronted with the fact that such deposits of salts should be fossiliferous, for the amount of marine life destroyed in the Kara Bugas is enormous, and the accumulation of organic remains in these deposits is unparalleled in the neighboring sea. Again, such accumulations of salt should be in close proximity to deposits formed under more normal marine conditions, for the saline gulf and the sea which supplies the salt water are separated only by a narrow bar. The failure of both these criteria in the Salina formation of North America makes it evident that this method of accumulation could not have been the one to which these salt deposits owe their existence. A good illustration of a salt deposit formed according to the bar theory is found in the Bitter Lakes of Suez, which prior to 600 B. C. formed the Heropolite Gulf, a continuation of the present Gulf of Suez. After the Gulf became separated by silting up to such an extent that the supply of water from the Red Sea only balanced the evaporation from the surface of the Gulf, salt began to deposit and continued until some time after the complete separation from the Gulf of Suez and transformation into the Bitter Lakes, when only the intensely saline mother liquor remained. When in 1861-63 the present canal was cut through these lakes a mass of salt 13 kilometers long, 6 kilometers broad and averaging 8 meters in thickness was found. In the center of Great Bittern Lake this salt mass was estimated at 20 meters in thickness. When discovered, the salt mass consisted of parallel layers of varying thickness, separated by thin layers of earthy matter and gypsum. Soundings to a depth of 2.46 meters showed 42 layers of similar composition and varying from 3 to 8 centimeters in thickness, while the earthy layers between them were only a few millimeters thick. These clayey layers were, as a rule, richly fossiliferous, containing the shells of numerous genera and species of molluscs now living in the Red Sea.* The contemporaneous marine deposits were of course found in the neighboring Red Sea.

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* The deposit covers an area of 1,300 square miles and has a thickness of 7 ft., making a total of approximately 1,000,000,000 tons of Epsom salt.

Desert Deposition of Salt.—There remains then only the method thought to prevail throughout the interior of continental areas, where salts accumulate under arid climates, but without any immediate or direct relation to the contemporaneous sea shore. There may, of course, be other methods by which salt is formed in extensive deposits, but they are at present unknown.

It is a well known fact that stratified rocks have a porosity varying from a fraction of one per cent. to 28 per cent. of the volume of the rock. This pore space, with certain exceptions, is greatest at the time of the accumulation of the clastics, before secondary or diagenetic processes have closed some of the interstices. If such sediments accumulate on the sea bottom, the pore space will, of course, be filled by sea water, and this sea water, or "connate water," as Lane has called it, will remain in the rock until removed by seepage or evaporation. When the ground-water level is high, the ordinary vadose or meteoric waters will help to prevent the escape of the connate waters. Where, however, such formations are raised above the permanent ground-water level, excessive evaporation, accompanied by mechanical disintegration of the rock, will remove the connate waters, leaving only their original salt content behind. These salts will form as an efflorescence among the disintegrating rock material, to be dissolved and swept away by the more or less infrequent rains. If drainage is free to the ocean, no further effect will be noticeable, but if the drainage is into an interior basin, whether occupied by a lake or not, this salt will eventually be deposited there as a desert salt, far removed from the contemporaneous oceans. Such deposits will be unfossiliferous, except for terrestrial or saline lake organisms or stray organisms of streams which find their way, or are swept, into the basin. Deposits of this kind will, of course, also show alternating layers of gypsum and salt, but such alternation need not be a regular one. Anhydrite is probably more common than gypsum. At intervals, layers of mud or coarse material will be washed or blown over the chemical deposits and so form parting layers, but the material of these parting layers is all derived through the disintegration and erosion of the enclosing rocks. Mother-liquor salts are likely to be absent in such deposits, since complete drying out of these salts under the influence of hot desert winds and hot drifting sands will also make it possible for the minute quantity of these salts to be blown away and become disseminated among distant accumulations.

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* Bader, H. Verhandlungen d. K. K. Geol. Reichsanstalt, 1869, pp. 287; 311.

The pore space of clastic rocks varies enormously, this being in part, at least, due to closing of the pores by diagenetic processes. The porosity of quartz sand usually varies between 30 and 40 per cent. Ordinary limestones range from 2.5 to 12.5 per cent., though some have a porosity as high as 25 per cent., while chalk has been credited with a pore space as high as 41 per cent. On the other hand, some compact limestones fall as low as 0.55 per cent. It must be borne in mind here, that the pore space of ancient rocks is today much less than it was while forming; thus the pore space of the Niagara reef rocks must have been vastly greater just after they were laid bare at the beginning of Salina time than it is at the present time, after ages of alteration. Even now the Niagaran limestone of Wauwatosa, Wis., has, according to E. R. Buckley, a pore space of 6.4 per cent. If we bear in mind the porosity of modern coral reef rocks, I believe it is not going too far to attribute an original porosity of 35 or 40 per cent. to these limestones. With sea water containing 3.5 per cent. of salts, of which 77.76 per cent. or a total of 2.72 per cent. is NaCl, we would obtain approximately 1 per cent. as the average content of sodium chloride of these ancient rocks, a quantity considered as generally applicable to the ancient marine strata by

Johannes Walther. That this is not excessive, but that in reality the amount of salt absorbed by marine strata is much greater, is shown by analysis of modern marine deposits. Thus, deep-sea red clay has been found to contain from 6.8 to 8 per cent. of NaCl; diatomaceous ooze, 5.4 per cent.; Globigerina ooze, from 1 to 3.4 per cent.; and Antarctic glacial clays, from 1.9 to 3.7 per cent.*

To form a bed of salt 100 ft. thick and covering an area of 2,500 square miles (which is probably more extensive than any single salt layer in the New York or Michigan basins) would require, on the basis of 1 per cent. of salt content, the destruction of an older marine clastic formation 10,000 ft. thick and covering the same area. The same salt bed might be derived from the destruction of an old marine formation 100 ft. thick and covering an area of 250,000 square miles, or an area equal approximately to that of the States of Ohio, Indiana, Michigan, Wisconsin and a part of Illinois. The area tributary to the Salina basins was probably three times the area of these States, or more, and, judging from the remnants of the Niagaran beds left in some localities, its thickness averaged at least 500 ft. and may have approached 1,000 ft., not to speak of the underlying marine Ordovicic strata. Thus at least 15 such salt beds could be obtained from the Niagaran beds, a large part of which are known to have been eroded during Salina time. It is probable that half this amount of salt is more than sufficient to form all the salt beds of the Salina basins of New York, Michigan and Ontario.†

The calcareous beds in the Salina series of New York and Michigan are undoubtedly formed from the lime sand and lime mud derived by the mechanical destruction of the older limestones (Niagaran). The magnesian character of some of these beds is accounted for by the partial dolomitic character of the limestones from which they were secondarily derived. The gypsum may, of course, be in part the calcium sulphate of the old sea water and in part altered limestones of the clastic type. Much of the lime sand and mud remained unused, however, until the advent of the Monroe sea over this region, when it was deposited as stratified clastics in this sea, or on its margins, to form the finely bedded Monroe strata.

Salina Salts Interpreted as Continental Deposits.—Considering the Salina deposits in the light of modern salt accumulations, it becomes apparent that of all the known methods of accumulation that of the continental fits best the conditions found, and explains all the characters of the deposits which, on the other hypotheses of origin, are difficult or even impossible of explanation. One of the strongest arguments in favor of the commonly advanced marine or estuarine origin of the clastic Salina deposits, the Shawangunk and the Longwood, thus falls to the ground, and we are driven to the conclusion that these deposits could not have accumulated in a body of standing water, marine or estuarine, because, as shown by the contemporaneous deposits in the interior basins where such seas should have been, there was no such water body in existence. Instead of this there was a desert area, parts of which were flooded momentarily by the infrequent streams which washed the saline efflorescence from the surrounding highlands and thus brought about their concentration in a circumscribed desert basin.

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* Andre, K. Geologisch. Rundschau, III, p. 355, with extensive bibliography.

† On the basis of the salt content of modern marine deposits, the amount of available salt might easily be considered as four times greater than that given by the above calculation.

E. G. Spilsbury.—In referring to Prof. Ochsenius' theory of salt deposition, I think, in order to make the matter clear, the whole of this theory should have been given a little more in detail. The diagram shown is the one on which his theory is based, but Dr. Grabau hardly emphasized the fact that the theory is based entirely on an intermittent action, and not on a continuous flow of water from the ocean into the lagune. The basis of his whole theory depends on the intermittency of the action. He supposes the lagune to be separated from the ocean by a bar produced by the action of waves and winds, closing more or less completely the entrance into the inland sea. For a while, this bar remains open to the surface waters of the ocean, but the lagune is subjected to more rapid evaporation than can be supplied readily from the outside; this evaporation causes the deposition, first, of all of the lime and magnesia salts, which cover the bottom of the lagune. As soon as these have been precipitated, and when further concentration takes place, the salt itself is precipitated. The amount of sea water coming in keeps up the supply for a certain time; gradually, however, owing to the currents caused by the difference in level due to evaporation, and probably owing also to tidal effect, the bar is gradually closed; then evaporation and consequent concentration of the salt liquors become much more rapid, the deposition of salt is nearly complete, and if left to itself the gradual dessication of the whole area would take place. High storms or extra severe tidal waves break through the barrier, the basin is again filled with water from the outside, and a series of repetitions of the phenomena take place. During all this time the potassium salts are accumulating in quantity and density, but not to an extent sufficient for deposition. The absence of organic remains in the deposit is explained by the fact that the density of the mother liquors accumulating over the deposit of salt is too great for them to sink into it; they are therefore held in suspension and are gradually stranded along the shores of the lagune and imbedded in the sands forming the coast line. Finally the closing up of the inlet becomes permanent and the evaporation continues to the point where the potash salts are in turn deposited. Before this happens, however, the salt deposit has been concentrated in area, as well as in thickness, by the leaching out and washing down, by rains, of the thinner crusts of salt which have been left dry by the receding waters.

Prof. Grabau.—Referring to the question of deposition of the potash salts by complete evaporation, I would call attention to the fact that you cannot get temperatures high enough for complete evaporation. The only possible way to bring this about is by heated sands drifting over the salt flat. There are no natural temperatures high enough to cause evaporation sufficient to precipitate these salts. That the organic remains are embedded in the bottom strata is shown by the fossiliferous strata in the bittern lake deposits of Suez.

E. G. Spilsbury.—I do not think that Prof. Ochsenius intended to infer that the precipitation of the bittern salts took place at the ordinary temperature, as in his works he refers extensively to the effects caused by eruptives of the Hartz Mountain range, and it is fair to suppose that these later eruptives could have provided heat enough for the final precipitation of the potash salts. In order to preserve these salts, when they were so deposited, it would be necessary for them to be covered over with hot sands, not only to provide the heat for their deposition, but later to protect them from atmospheric moisture of every kind. Ochsenius' theory was based on the assumption of the final closing of the bar, and that the deposition of potash takes place only after that is accomplished. In all of the German occurrences there are two periods of salt deposition, and it is between these two that the deposition of the potash salts has occurred, the lower being known as the old salt beds, while the upper layer is known as the new salt.

Prof. Grabau.—The German deposits are believed to have resulted from the evaporation of an extensive cut-off from the sea, reaching from England on the west to the Ural Mountains on the east. The concentration of this water into the central area has brought about the extensive deposits there found.

There undoubtedly was repeated supply of salt water from the neighboring ocean, as shown by the numerous layers of gypsum. Finally, however, complete evaporation took place, with the deposition of the bittern salts. There is independent evidence that dry climatic conditions prevailed during this period. A refilling of the basin resulted in the formation of the second or new salt series. We have also evidence of the existence, in the neighborhood, of the open Permic ocean.

A. H. Cowles.—There is an anticlinal in the rocks of Ohio extending from Sandusky to Columbus, and on to Cincinnati, thus leaving Silurian rocks of an age older than the Salina formation exposed by denudation and erosion of the absent strata. The Salina formation comes to the surface to the east of this anticlinal in a band running almost north and south dipping to the east, below the Devonian series; it also comes to the surface west of the same, encircling the northwest corner of Ohio and off into Indiana. Undoubtedly the salt deposits that exist to the east were once connected with those that exist under Detroit, but erosion through central Ohio has broken this connection.

Prof. Grabau.—It has recently been shown that the so-called Salina rocks of the Ohio Anticline are of later age (Monroan or Upper Siluric). The Salina was apparently never deposited in northwestern Ohio.

E. G. Spilsbury.—Ochsenius considers this matter, and according to his theory the organic remains brought into the lagune were killed by the concentrated condition of the liquors they came in contact with; they were not deposited on the bottom layer of salt, owing to the density of the supernatent liquors, but were carried around in the upper waters and what remained of them was gradually deposited along the shore line. In all deposits in which we find no fossils or signs of organic life in the salts themselves, we do find such life in the surrounding rocks.

Prof. Grabau.—The fossils found in the border rocks of the older salt deposits are of earlier or later age. I cannot speak as well of foreign deposits, but I know in the case of our own formations, where we have salt deposits, the rocks are all absolutely barren of organic remains except at the very base. In the beginning there were certain forms of organisms and they either left or were killed off. The most important of these, the Eurypterids, I believe were river animals and not marine.

A. H. Cowles.—In the principal concentrated lakes, I believe there are no organisms.

Prof. Grabau.—There are some organisms in the Dead Sea; only a few of them. As a rule nothing can live in highly saline waters.

E. G. Spilsbury.—After evaporation takes place, there is always a layer of salt on the slopes. Now this is probably dissolved again by surface waters, which wash them down, causing reconcentration in what is now the salt basin.

H. H. Knox.—I should like to ask Dr. Grabau to explain the origin of the Louisiana and Texas salt deposits. From the sections that are published, they appear to have been thrust up from below through the over-lying strata, and are not horizontal deposits.

Prof. Grabau.—This is the type I avoided because it is a secondary one. There is a good deal of discussion on this subject, especially among the Germans. There are two groups of investigators on this subject. One believes that it is due to the thrusting up of the rock mass, i.e., a tectonic deformation, the other group believes it is due to crystallization. The idea is that by secondary crystallization the masses have forced their way to the surface. Prof. G. D. Harris has written on this subject, and it has recently been summarized by Dr. F. F. Hahn, in "Economic Geology."

A. H. Cowles.—In connection with the formation of the columnar salt deposits of Texas, if a stratum of almost impervious rock existed above a horizontal bed of salt, with fresh water in and above such a stratum, under hydrostatic pressure, the tendency of the fresh water to diffuse into and dilute a saline solution would cause a great osmotic pressure; such pressure might become sufficient to cause a salt bed containing water to burst upwards through a mass of overlying rock at some point where the resistance is the least. This is a possible explanation of the phenomenon. Further, the formula of Van-Hoff, as given in works treating on the theory of electrolytic disassociation would enable a calculation to be made of the maximum amount of osmotic pressure that could be created under such conditions.

MEETING OF FEBRUARY 13, 1913

A meeting of the New York section was held, after an informal dinner at the Chemists' Club, at the home of D. M. Riordan, on Thursday, Feb. 13, at 8:45 p.m. The meeting was called to order by the chairman, Mr. Stone.

Those present were: C. R. Corning, L. D. Huntoon, H. S. Munroe, R. Peele, W. A. Pomeroy, D. M. Riordan, George W. Riter, G. C. Stone, O. Sussman, J. A. Van Mater, A. L. Walker, and H. M. Burkey, guest of Mr. Sussman.

The Chairman.—The minutes of the last meeting having been printed, unless there is some objection or correction, they will stand accepted as published.

The subject for discussion this evening is the new mine accident laws of Mexico. Mr. Dufourcq, who translated this mining code for us, unfortunately will not be able to be with us this evening. I had hoped that Mr. Ingalls, who is chairman of the U. S. Bureau of Mines on the Prevention of Mine Accidents, would be here this evening, but it will not be possible for him to attend, and Mr. Channing, another member of the committee, is in Arizona.

[The new mining regulations of Mexico, as printed in Bulletin 56, pages 11 to 20, were then read, certain paragraphs of which provoked comment, as follows:]

Chap. III., Art. 12. When ladder-ways are established in shafts, the space between which they occupy must be separated from the rest of the shaft, as well as from any moving piece of machinery, by means of a division or partition of wood or other convenient material. The ladders in these roadways, and the platforms upon which they rest, must offer sufficient security and must be easy of ascent and descent by the workmen.

R. Peele.—It seems to me that it would have been wise to include some provision for vertical ladders. This is rather important, where so much climbing is done, as in the Mexican mines.

D. M. Riordan.—I am wondering, in this connection, what they would call easy. A Mexican can climb a chicken ladder with a load of 100 *arroba* on his back, and would regard that as easy.

W. A. Pomeroy.—In Australia the law establishes the distance between each two rungs; and you are not allowed to place ladders within a certain distance of a wall, so as to assure sufficient toe room.

Chap. III., Art. 15. Notices in large, clear letters shall be posted in a visible place in the engine house, at the mouth of the shaft and at the entrances of tunnels and of crosscuts, stating the rules and signals for the operation of hoisting machinery. Only those in charge of such operations in the shafts shall be allowed to give orders or signals.

Mr. Stone.—At Franklin, N. J., the only man who can give a signal is the skip tender. Anyone can signal to the skip tender, but not to the engineer. It is a physical impossibility to do so because the skip tender is the only man who has the key.

Chap. IV., Art. 19, Par. I-a. Magazines built on the surface must be of light materials, waterproof and poor conductors of heat, with walls of brittle material, and shall be located with respect to each other and with respect to buildings, public roads and railroads, ,at such a distance as may be considered proper, taking into consideration the maximum quantity and the strength of the explosives which are to be stored. Parapets should be constructed near the magazines on the sides where an explosion might cause damage.

D. M. Riordan.—I was once in charge of a mine when 10 tons of giant powder went off, notwithstanding the fact that we had posted signs in letters 18 in. long forbidding anybody to enter the magazine with a pipe. Two fellows went in and were never seen again. The direction in which the explosion exerted its force would be hard to conjecture. It was a singular circumstance that the side of the hoisting works facing the explosion did not suffer a single pane of broken glass, while the other side was crushed in. There was just a hole where the magazine stood. In the boarding house there must have been 50 or 60 men changing their clothes. Not one of these men was injured, though the boarding house was leveled to the ground. In a hoisting engine which was in motion at the time we discovered afterwards that all of the spokes (it had a small flywheel with spokes about 8 in. wide and 3 in. thickness) had been cracked off from the hub so neatly that we did not discover it until some time afterward. The clock in the hoisting house had its pendulum thrown off while the door remained closed. One workman had all the membrane loosened from his bones, and it took a long time to bring him around. I am reminded of that event by the sentence, "Parapets should be constructed near the magazines on the sides where an explosion might cause damage."

Chap. V., Art. 21. In the workings in active operation, a current of air shall be maintained of a velocity not greater than three meters per second and the air shall be supplied so that the atmosphere will not contain more than 0.5 per cent. of carbonic acid nor more than 1.5 per cent. of fire-damp.

H. S. Munroe.—This is a distinct advance. The latest thought is in the direction of requiring purity of air rather than a certain amount of air. The practice in the anthracite regions of Pennsylvania is to bring the fire-damp down to at least 2% and preferably 1%. In bituminous mines in which explosive coal dust is present it should not be more than ½%. Where there is carbon dioxide, it should not be more than 0.2%. The Mining Commission of South Africa recommended that it should be less than 20 per 10,000, and even that is considered a liberal provision. Carbon monoxide should not be more than 0.01%.

This article, while it is a step in the right way, is not sufficiently stringent.

Chap. V., Art. 29. Of every mine in operation, plans shall be maintained showing the ventilation, on which may be seen clearly and in detail both the general plan of ventilation for the whole mine as well as for all of the workings, and on said plans shall be added at least once a week the new workings opened in the mine.

H. S. Munroe.—That is an unfortunate provision. In order to get effective ventilation it may be necessary often to change the scheme of ventilation. It is frequently necessary to change the coursing of the air on short notice, in order to carry the air where most needed. It may be needed in large quantity four or five times the usual amount on account of the sudden appearance of fire-damp.

R. Peele.—It should be very easy to keep the plan up to date, at least at intervals of a week. Any change during the previous week would be noted on the plans, which would be accepted for the next week.

H. S. Munroe.—That would not help you out if you had to change the ventilation in an emergency.

Chap. VII., Art. 37. Such cases as are not provided for in these Regulations shall be decided upon by the Department of Fomento, which will give the inspectors the necessary instructions for properly executing the commissions which may be entrusted to them.

H. S. Munroe.—The only real criticism I think that we can make now is that these provisions are of so general a nature that each one will require special interpretation. The interpretation is apparently left to the discretion of the inspectors in a large number of cases. A law of that kind is very unsatisfactory, both to the operators and to those who work under them.

C. R. Corning.—This seems to be merely a code of police regulations and not a law.

W. A. Pomeroy.—The Mexican mining law says very little about mining operations. It deals more with the acquiring of property, the payment of taxes, and matters of that nature.

The Society and the Institute.

C. R. Corning.—Is the plan for consolidation of the Society and the Institute, as outlined in Bulletin 56, a fitting subject for discussion?

The Chairman.—I do not see why it is not.

H. S. Munroe.—It is a matter which will be brought before the Society, and I think it would be a very desirable thing to have discussion on the subject at this meeting. As a member of the Council and also of the committee that drew the proposed plan, I feel sure that the Council will welcome any suggestions before the matter is put into final form for submission to the Society. I do not know how easy it will be to make any change, for the reason that the plan, as published, has been approved by both the Council of the Society and the Council of the Institute, so that, as it stands, it is in the nature of a tentative agreement.

C. R. Corning.—What right has the Council to obligate the Society?

H. S. Munroe.—It is only a tentative agreement, subject to approval by the membership of the Society.

C. R. Corning.—I have a very serious objection to it. I have had a great deal of experience the last year in matters connected with the Institute, and this has been on hand before. There is a desire to get the M. and M. Society out of the way, and also a desire to make the Society a financial benefit to the Institute. I do not think that either attitude is a proper one, and I should vote distinctly against this plan. The arrangement would practically abolish the independence of the Society, and would make it contribute financially quite heavily to the Institute. The Society, as a society, has done very well; it has a surplus, and no obligations, and I do not believe in turning over to the Institute any such surplus or portion of such surplus. I wrote a letter to Dr. Chance today and will send it tomorrow.

In paragraph 4 of this tentative agreement the first line, "The Society to make membership in the Institute a qualification for membership in itself," is impossible. The Society cannot alter the status of its members.

A. L. Walker.—The wording is faulty. In other words, the Society cannot force those who are already its members to become members of the Institute.

C. R. Corning.—I object to this suspension of a by-law. I think the membership should be allowed to select its own members. As to our surplus, this is accumulating at the rate of $500 a year, and I do not see why we should contribute that to the Institute for nothing.

W. A. Pomeroy.—What is the object of this proposal? Is there a feeling that there is not room enough for the two societies?

G. C. Stone.—The feeling is that the two societies are opposed to one another, and it is with the idea of removing that feeling more than anything else that the arrangement under discussion has been proposed. The societies have worked on different lines, but I think there is a general idea that there is opposition.

W. A. Pomeroy.—Why should we take all this trouble to put someone right who is thinking wrong? It seems to me that two societies are desirable.

C. R. Corning.—The proposed plan does not represent the idea that Mr. Stone and myself had when we were arranging for affiliating with the Institute. We were discussing this last summer, and we came to the conclusion that it would be well to have certain affiliations—not an absorption—but merely a closer bond. The plan published on pages 2 and 3 of Bulletin 56 does not represent that idea. It involves an annulment of the Mining and Metallurgical Society, a practical absorption, and to that I most seriously object. This is not at all what was in the minds of those who originally thought of affiliation. Paragraph 6 makes us a collecting agency for the Institute. Let the Institute collect its own dues.

G. C. Stone.—That paragraph also leaves it a little uncertain as to who is responsible for the $15. Supposing a member does not pay his dues; of course, the Society must pay the dues of its members in the Institute.

C. R. Corning.—According to paragraph 8, the Society's proceedings are to be published by the Institute. That takes away our independence.

G. C. Stone.—That is unsatisfactory. It is uncertain whether the Institute is obliged to publish anything that the Society wants. On the other hand, if the Institute declines to publish something, the Society has no means to publish it for itself.

C. R. Corning.—I think we should be in a position to publish our own transactions. If it can be done better and cheaper by the Institute than by anyone else, that is for us to decide.

R. Peele.—What does the Mining and Metallurgical Society gain by this proposition.

C. R. Corning.—It eliminates a certain feeling, a certain sentiment.

G. C. Stone.—We shall gain members. Certain persons who will not join now will then be free to join.

R. Peele.—Shall we be any better off, or any happier?

D. M. Riordan.—Is it not possible that it would widen the influence of the Society if its proceedings should reach a larger number?

C. R. Corning.—In my letter to Dr. Chance I will enclose a copy of the draft of the provisions for affiliation with the Society, framed by Mr. Stone and myself. Mr. Stone and I thought over this plan very carefully, and we know of other societies where a similar arrangement has worked well. I feel as I do about this matter because I know positively of certain members who have joined with the idea of absorbing the Society into the Institute. I know that from personal knowledge. I do not wish to see anything more of that kind, because if they should happen to get a majority of the membership inclined that way, there is nothing to prevent an entire dissolution of the Society, and we should lose our independence altogether. If this plan goes through, that will certainly happen. The plan originally in mind (and I had something to do with starting it) was simply an affiliation, which would mean a friendly relationship between the two societies, such that where one could be of benefit or assistance to the other, it would be done. Paragraph 9 entirely subordinates the Society to the Institute.

O. Sussman.—How large a majority is necessary to carry through this proposal?

H. S. Munroe.—A majority of the entire membership. A letter ballot will probably bring replies from not more than 50%; it will then be necessary to have a second letter ballot before we get even half of the members to vote. In framing the constitution we purposely made it difficult to amend the constitution.

C. R. Corning.—I think affiliation on certain general lines very desirable, but I do not think we should be swallowed up.

R. Peele.—Affiliation on very general lines appeals to me, but I would not approve of the proposition as it stands now.

The Chairman.—I think the proposal that we drew up left the Society free and at the same time did away with any bad feeling.

C. R. Corning.—Would it not be possible to send those few paragraphs to the Society and have them published with the discussion?

The Chairman.—Yes.

C. R. Corning.—According to paragraph 9, the Institute will represent the Society. I do not see any reason why the Institute should represent us.

W. A. Pomeroy.—It seems to me that we are put in the position of the bad boy who needs to be spanked.

C. R. Corning.—Paragraph 10 I would omit, and leave it to friendly feeling to decide what work is to be done. It looks to me as if this thing will cut out the Society and make it a collecting agent, a sort of financial assistant, to the Institute.

H. S. Munroe.—I think perhaps a word or two with regard to this movement may be of interest from the standpoint of the Council. It is believed that we can accomplish three things. First, we shall eliminate the idea that there is any antagonism between the Society and the Institute. This is, of course, wholly imaginary and this idea is confined to members of the Institute who are not members of the Society. By such a consolidation or affiliation this appearance of rivalry will disappear. Second, we wish to be able to add to our body some exceedingly desirable men who now stay out because of the supposed antagonism and do not want to be put in that position. A large number of very desirable men we will get in no other way than by burying this ghost of a hatchet. Third, we shall get a very much wider public for our expressions of opinion, and for the other work we do. Instead of a limited membership of less than 250, we shall have the attention of 5000 members of the profession. We can reach a larger number of persons, and we can exert a larger and a greater influence. These three objects, I think, are very desirable ones. I think personally that possibly they may be secured by a less intimate relation than is here proposed.

C. R. Corning.—The membership of this Society is going to decide if anything is to be done. You will find that the membership here will not submit to absorption.

G. C. Stone.—I think that most of us will agree that the argument of Prof. Munroe is good, and that the objects he describes are very desirable ones, but that they should not be attained by absorption.

H. S. Munroe.—With regard to the surplus above $2500, it lies entirely with the Council and the Society whether there shall be any surplus. We are perfectly free to spend our money, and there will be no use or need of accumulating a surplus.

C. R. Corning.—The idea of Mr. Stone and myself was first to try affiliation and see how it works; then if we want closer relations afterwards, that can be readily arranged. But for the moment we want only an affiliation, which should be of the most general terms and interfere as little as possible with either the Institute's functions or our functions.

I would like, Mr. Chairman, to embody in the minutes of this meeting the outlined plan of affiliation between the Mining and Metallurgical Society of America and the American Institute of Mining Engineers, as drafted by Mr. Stone and myself and published on page 13 of Announcement No. 8 of the American Institute of Mining Engineers, dated October 15, 1912, which reads as follows:

A. That the total membership shall be qualified to become, and that at least three-quarters of the members of the Society desiring affiliation shall be, or become, members of the Institute; and that the affiliated Society shall pay to the Institute, out of its funds, an annual contribution for each of its members not a member of the Institute equal to the dues he would have paid if a member.

B. After affiliation, membership in the Institute shall be a prerequisite qualification for admission to such Society.

C. No member of such affiliated society who is not also a member of the Institute shall have the right to vote or hold office in the Institute or attend business meetings, but he shall have all the other rights of membership.

D. Such Societies may elect their own officers and retain and maintain their own Constitution and By-Laws, provided the same do not at any time conflict with the Constitution and By-Laws of the Institute, and that they are approved by the Board of Directors of the Institute.

E. Such affiliated societies shall have the right to assess dues on their own members in addition to the dues of the Institute and shall have the exclusive control of all funds so raised.

F. All papers and transactions of such an affiliated society shall be published in the *Bulletin* and *Transactions* of the Institute if approved by the Committee on Papers and Publications, and if not in conflict with the Constitution and By-Laws of the Institute. All the members of such affiliated societies shall receive all of the publications of the Institute on the same terms as the members of the Institute. Any such society will retain its right to issue special publications under its own name, which must be announced in the Bulletin, in which case all of the members of the Institute shall be entitled to receive such publication free of charge.

G. The connection between such a society and the Institute may be terminated on the giving by either of six months' notice and settling all indebtedness.

D. M. Riordan.—I move that the Council of the Society be requested to formulate an appropriate resolution expressing the sorrow of the Society at the death of Mr. John Fritz, who did so much to advance the science of metallurgy in his lifetime, and left a record of which any man may be proud.

The motion was seconded by A. L. Walker, and carried.

The meeting adjourned at 10.30.

Louis D. Huntoon,
Secretary of Section.

SAN FRANCISCO.

MEETING OF FEBRUARY 3, 1913

The annual meeting of the San Francisco section of the Mining and Metallurgical Society of America was held at the Hotel Oakland, Oakland, Feb. 3, 1913, following dinner at 7 p.m. The meeting was called to order by S. B. Christy, chairman. Present: H. F. Bain, E. H. Benjamin, F. W. Bradley, P. R. Bradley, Corey C. Brayton, S. E. Bretherton, Albert Burch, F. G. Cottrell, J. B. Keating, A. C. Lawson, T. T. Read, M. L. Requa, L. H. Duschak, R. G. Walker.

The report of the secretary, H. Foster Bain, for the past year was presented, audited, and approved. The election of officers for the ensuing year followed. It was moved and seconded that S. B. Christy be re-elected chairman for 1913. The motion was put by F. W. Bradley and carried. H. Foster Bain was nominated as secretary but declined re-election, nominating P. R. Bradley, who also declined. T. T. Read was nominated and, there being no other nominations, was duly elected secretary. The chairman expressed the thanks of the section to the retiring secretary for his valued services rendered during the four years of his tenure of office. H. Foster Bain then made a short statement for the information of the members present, of the progress and status of the negotiations for the affiliation of the Mining and Metallurgical Society with the American Institute of Mining Engineers. The chair man then introduced the speaker of the evening, Mr. A. J. Pillsbury, chairman of the Industrial Accident Board of California.

THOMAS T. READ, *Secretary of Section.*

[The report of Mr. Pillsbury's remarks has not yet been received from San Francisco. It will be published later.]

MEETING OF DECEMBER 9, 1912

(The following address by Mr. George T. Edwards, of Berkeley, Cal., was delivered, by invitation, at the meeting of the San Francisco section on Dec. 9, 1912, minutes of which appeared on page 186 of Bulletin No. 55. The manuscript did not reach New York in time to be included in that Bulletin; hence it is printed here as a part of the minutes of that meeting.—*Secretary.*)

The Status of the Public Lands, and Its Relation to Mining Tenures.

By George T. Edwards.

The public demand for conservation has raised some most basic questions, which are now before our states and our nation. It also goes to the foundation of the mining industry, which has grown for a century on the ability of the miner to obtain a full title to his mine. For this old and successful policy, it is now asked that the title to coal, oil and other mineral lands shall remain permanently in the United States, and that development shall be made, under leases, subject to national regulations.

The question as to whether the United States has the power to make this change goes to the foundation of our nation, and is broader and deeper than the constitution. It requires a study of the nature of the tenure of the public lands.

The problem as to the best disposition to make of the public lands is essentially the same problem that was under debate when the United States became a nation. The settlement that was reached then was one of the main factors in developing our country into what it is today, and the adjustment made now will be an important factor in determining whether we shall continue to be a republic of sovereign states, bound together by a national government, or shall develop into a powerful central government at the expense of the states.

The title to the public lands is a historic growth. It rests on the grants, by the English Crown to the original colonies, of great areas in the wilderness of the West. These grants overlapped and were indefinite in extent. One grant to Virginia was 400 miles wide, and extended from the Atlantic to the Pacific.

After the Declaration of Independence, each colony was sovereign in every respect, until some of the attributes of sovereignty were surrendered to the national government. This full ownership and sovereignty extended to the western lands; and the United States has never acquired a greater title to the public lands than was granted under the deeds giving control of them to the United States.

The Articles of Confederation contained the clause, "Provided also that no state shall be deprived of territory for the benefit of the United States." It was around this clause that the long, difficult, and acrimonious negiotiations turned, which Congress conducted through years in order to secure control of the western lands. The original states wished to retain the large areas of public lands within their recognized borders; the contest lay in regard to the wilderness to the west. It was the firmness, insight, and constructive statesmanship of Virginia that determined the final status of the public lands.

After much debate, the situation began to clarify, and on Oct. 10, 1780, Congress made a tender to the states holding western lands, pledging the nation to dispose of these lands for the common benefit of the United States, so that they should be settled and formed into distinct republican states, having the same rights of sovereignty, freedom, and independence as the original states.

Subsequently, Virginia made her counter tender, reaffirming the conditions offered by Congress, and insisting that the lands "should be faithfully and bona fide disposed of for that purpose and for no other use or purpose whatever." Congress, on Sept. 3, 1783, agreed to these terms.

On March 1, 1784, Congress accepted the deed of Virginia, conveying the consideration, including "all right, title and claim, as well in soil as jurisdiction, which this commonwealth hath to the territory, or tract of country * * * upon the condition that the territory so ceded shall be laid out and formed into states. * * * That the states so formed shall be distinct republican states, and admitted members of the federal union; having the same rights of sovereignty, freedom and independence as the other states * * * That all the lands within the territory so ceded * * * shall be considered as a common fund for the benefit of such of the United States as have become, or shall become members of the confederation * * * and shall be faithfully and bona fide disposed of for that purpose, and for no other use or purpose whatever."

Thus the contract was closed, under which the United States secured control of the public lands; and the trust was created, by which the United States is entitled to make a profit by disposing of the public lands; but is required to dispose of them within a reasonable period, in order that sovereign states may be created out of them, equal in every respect to the original states.

The long, bitter, and acrimonious negotiations between Congress and the states, regarding the western lands, was terminated by the settlement with Virginia. Deeds from the others followed, but our land policy and the development of the nation were fixed by this settlement.

It is upon this contract that the equality of the states rests. This entire equality has been reaffirmed many times, by the United States Supreme Court, with unvarying uniformity. Its importance cannot be overestimated. It is equal to that of the Constitution itself. One is the warp and the other the woof out of which the grand fabric of this nation has been woven.

How historians could have overlooked this great contract fills one with amazement. It should be a matter of common knowledge with all school children. It was by insisting on this contract, creating equal states, that Virginia earned her great distinction of being called the mother of the newer states. Had the western lands been held absolutely by the United States, or had inferior states been created out of them, a great part of our area would still be a wilderness, dominated by a central government, which now would be strongly, if not completely, monarchical in character.

As soon as title was secured, Congress undertook the work of formulating the necessary rules and regulations for disposing of the public lands. The first step was the ordinance of April 23, 1784, which Congress declared to be a charter of compact and fundamental constitution, unalterable but by the joint consent of the United States and of the particular state within which such alteration is proposed to be made. This was repealed and a new ordinance was substituted July 13, 1787, reaffirming these conditions, but going more into detail than the earlier ordinance. This has been the basic ordinance, on which all western territories have since been organized, and formed into states.

The convention which formulated our present national constitution was a body subordinate to Congress, and was required to report to Congress, by the Articles of Confederation. Both bodies were in session at the same time, in Philadelphia, when Congress adopted the ordinance of July 13, 1787, and the clause in the national constitution governing the public lands was formulated in conformity with this ordinance, and with the contract under which the public lands were acquired.

The clause in our national constitution relating to the public lands confirmed and perpetuated the contract which Congress made with Virginia in order to secure control of the public lands. It reads as follows: "The Congress shall have power to dispose of and make all needful rules and regulations respecting the territory or other property belonging to the United States; and nothing in this constitution shall be so construed as to prejudice any claims of the United States, or of any particular state." The claims of the United States refer to the profit, which the nation is entitled to make by disposing of the public lands; and the claims of any particular state are the rights to have the lands pass to the ownership and sovereignty of the states where they lie, within a reasonable period. The deed which the United States gives to the grantee is the deed of a trustee, having the power of disposition and sale.

Several of the original states, which had no public lands, made a long and earnest effort to secure absolute title for the United States. Congress urged Virginia to convey without conditions or limitations, but Virginia resolutely refused to do so.

The legal effect of the limitations, under which the United

States secured control of the public lands, was established by the United States Supreme Court, in 1845. In Pollard's Lesses *v.* Hogan (3 How. 212) this court declared "The United States never had any municipal sovereignty, jurisdiction or right of soil in and to the territory, of which Alabama, or any of the new states were formed, except for temporary proposals, and to execute the trusts created by the acts of Virginia and Georgia legislatures, and the deeds of cession executed by them to the United States, and the trust created by the treaty with the French Republic, of the 30th of April 1803, ceding Louisiana. * * * When the United States accepted the cession of the territory, they took upon themselves to hold the municipal eminent domain for the new states, and to invest them with it, to the same extent in all respects, that it was held by the states ceding the territory."

This theory of a trust, held by the United States for the public-land states, completely harmonizes the varying decisions of the courts, dealing with land and water rights, which have been rendered more recently. Local customs have grown up, which differ in the several states. Under the theory of a trust, each state is entitled to take its share of the public lands in any way that it prefers to take them. But the theory of ownership in the United States, being based on a fundamental error of fact, has led to the irreconcilable confusion and contradiction found in some of the more recent decisions.

For more than a century, Congress has been controlled by the historic influences under which the public lands were acquired. The laws have been devoted to disposing of the public lands. But, in time, Congress forgot that it was administering a trust, and has used the words of ownership. The United States still holds lands in Wisconsin and Michigan, which were part of the territory specifically in view when the contract was made with Virginia; and in all the other states, in the various areas which have been acquired subsequently.

The fundamental principle, which controlled the original acquisition of the public lands, and which must be recognized as basic, now is that the ownership of the soil and sovereignty cannot be separated. If the United States shall seize and appropriate to its own uses vast areas within the reserve states, it will eventually establish full sovereignty there, which ultimately will destroy our present fabric of state and national government. For this new type of holding is, in fact, nothing more nor less than establishing dependent provinces within the borders of the reserve states. Swift advances, in this direction, have been made recently, in the arbitrary exercise of federal power, through its civil, military, and judicial representatives.

The rights of the reserve states, and all that is genuine in conservation, can be secured by creating new trusts, by agreement between the United States and each reserve state, which shall be in harmony with our political structure and with the rights of the states in which the public lands lie. The public lands can be placed in the hands of boards of trustees, who shall administer them mainly for these states, but shall also protect the limited equity which the United States has in the public lands.

OTHER SOCIETIES

A. I. M. E. The annual meeting was held on the morning of Feb. 18. Doctor Ledoux moved to change the order of business from the old rules and the motion was carried. He stated that he and Doctor Douglas held 562 proxies in favor of the adoption of the new constitution and six against it. When voted upon, the constitution was adopted, with the provision, however, that the Corning-Stone amendments and the clause providing for a class of fellows, should be considered separately. The several Corning-Stone amendments were carried by votes ranging from 334 to 386 in favor of them to votes of 221 to 179 against them. With respect to the proposed amendment creating a class of "fellows," Prof. J. W. Richards, chairman of the committee on constitution, stated that this amendment had been submitted by request, that the committee itself did not favor it, that in view of the pending plan of union of the Mining and Metallurgical Society with the Institute it was quite unnecessary, and that the committee advised an adverse vote upon it. The "fellows" amendment being then put to vote was defeated by 313 to 258, the votes of the members present in person being decisively against it.

Doctor Douglas reported for the land committee that replies had been received from 10% of the letters sent soliciting subscriptions toward wiping out the land debt, but that on the debt of $68,000 there was subscribed either in cash or in good promises, $59,125. A few individuals stand ready to make up the remaining deficit, but he strongly urged that members who had not yet contributed make up this amount. Mr. Dufourcq referred to the pending plan of union of the Society and the Institute and offered a resolution expressing the sentiment of the Institute as being against affiliation with the Mining and Metallurgical Society except under the same conditions as it might affiliate with other technical societies. Mr. Dufourcq stated that the Society and the Institute were not rivals and that the Society should not sacrifice its independence by merging. Mr. Dufourcq's resolution was laid on the table by a vote of 54 to 5.

The following officers were elected: President, Charles F. Rand; past presidents, Charles Kirchhoff, and James F. Kemp; vice-presidents, one year, Karl Eilers and Waldemar Lindgren; vice-presidents, two years, B. B. Thayer and Sidney J. Jennings; vice-presidents, three years, T. H. Leggett and F. W. Denton; directors for one year, W. J. Olcott and C. S. Robinson; directors for two years, E. L. Young and J. A. Holmes; directors for three years, John H. Janeway, Jr., J. W. Finch, J. W. Richards, E. P. Mathewson and L. D. Ricketts; director for two years to fill unexpired term of Mr. Rand, R. W. Hunt; director for one year to fill unexpired term of Professor Kemp, James Gayley. W. J. Olcott declining to serve, C. W. Merrill, of San Francisco, was elected a director in his place. The new board of directors met on Feb. 19 and elected Bradley Stoughton as secretary.

Colorado Scientific Society.—E. Lyman White, formerly State Commissioner of Mines, has been appointed secretary of the committee of the Colorado Scientific Society on the prevention of mine accidents, vice A. J. Hoskin, resigned. Mr. V. G. Hills is the chairman of this committee.

The Lake Superior Mining Institute has a committee on the prevention of mine accidents, which is to report at the next meeting of the Institute, probably next August.

OBITUARY

George William Maynard, a prominent mining engineer, died at the home of his sister, Mrs. F. S. Matthews, in Boston, during the night of Feb. 13. Mr. Maynard, who had been in poor health for several years, became suddenly sick last fall while engaged in professional work in the Southwest, and had to be taken to a hospital in Denver. After a partial recovery there he was brought to New York, where he had to undergo an operation in a hospital here, which confined him for several weeks, but after leaving the hospital he was still in feeble health, and considering his years, the news of his death did not come unexpectedly.

Mr. Maynard was the dean of the mining engineers of America, having entered the ranks before there was any mining industry worth speaking of in this country, barring the lead mining in Missouri and Wisconsin, the early operations in copper mining in the Lake Superior region, and a little iron mining here and there. He was the oldest mining engineer graduated from the Columbia University, but he passed through Columbia before its school of mines had been established.

Mr. Maynard was born in Brooklyn, N. Y., June 12, 1839.

He graduated from Columbia College, as it was then, in 1859. After graduation he spent a year in the chemical laboratory of Columbia, during which time he received a prize of $100 in recognition of certain work. In 1860 he went to Germany and for a year studied chemistry, physics and mineralogy in the University of Göttingen. While there he was a fellow student with J. Pierpont Morgan. Leaving Göttingen he spent a year at Clausthal in the Harz, studying mining and metallurgy in the Bergakademie there. In 1862 he received the degree of Master of Arts from Columbia.

Having completed his studies, Mr. Maynard began his professional practice with an engagement at the Connoree mines in County Wicklow, Ireland, where he remained a year occupied in chemical and metallurgical work. In 1864 he returned to New York, where he established an engineering office and chemical laboratory. In April of that year he was called upon to make a professional examination of a mining property in Colorado, which was his first visit to the new mining regions of the Rocky Mountains. He was so much attracted by the possibilities there that in December, 1864, he returned to Colorado and established an engineering office and assay laboratory in Gilpin County, which was perhaps the first institution of that kind in that part of Colorado.

Mr. Maynard returned to New York in the winter of 1867 and took charge of a sulphuric-acid works on Staten Island. In 1868 he was appointed professor of mining and metallurgy at the Rensselaer Polytechnic Institute, Troy, N. Y., and occupied that chair until 1872, when the mining department of that institution was discontinued. In 1873 he went to London, which was his headquarters during the next six years. During this period he spent six months in Eastern Russia, erecting a copper-reduction works for a British company at Voskrevsenky. During this period he was consulting engineer for several iron and steel works in England and Wales, and in such capacity made at Middlesbrough, England, the first demonstration in a large way of the Thomas-Gilchrist basic bessemer process of steel making. This brought him into very intimate relations with that lovable character, Sydney Gilchrist Thomas.

Mr. Maynard returned to New York in 1879 for the purpose of introducing the Thomas-Gilchrist process into the United States, which he succeeded in doing by selling the patents to the Bessemer Co., afterward known as the Steel Patents Co. Subsequent to that time Mr. Maynard remained a resident of this country, save for such brief professional trips as took him abroad. He was engaged in active practice as a consulting engineer right up to the date of his last illness, visiting Nova

Scotia, British Columbia, the Yukon, Mexico and Cuba in connection with his mining and metallurgical work.

Mr. Maynard was one of the original members of the American Institute of Mining Engineers, and many years later he became one of the original members of the Mining and Metallurgical Society of America. He was also a member of the American Museum of Natural History, the Metropolitan Museum of Art, and the Engineers' Club of New York. In 1865 he married Miss Fanny Atkin, of New York.

Mr. Maynard was known to almost everybody in the mining and metallurgical profession, in which he was highly esteemed, by the old men as a confrère of their early days and by the young men as a charming old gentleman whom it was always a pleasure to meet.

PERSONALS

George E. Collins was re-elected president of the Colorado Scientific Society at the annual meeting in Denver.

J. R. Finlay has gone to Southeastern Missouri to value the St. Joseph Lead Co.'s and Doe Run Lead Co.'s properties and will be engaged there until the end of March. Mr. Finlay will deliver a series of lectures at Harvard University from April 1 to 15.

F. Lynwood Garrison has been retained as chief engineer in charge of exploration of placer lands controlled by the Breitung Mines Corporation in Colombia. Mr. Garrison sailed for Colombia on Feb. 1, accompanied by a corps of four assistant engineers.

D. C. Jackling has been chosen managing director for the Alaska Gold Mines Co.

J. F. Kemp delivered a series of lectures on ore deposition before the science undergraduates at McGill University Jan. 27 to 28. During his stay in Montreal he was entertained at a luncheon by the Canadian Mining Institute.

J. Volney Lewis' treatise on "Descriptive Mineralogy" has just been published.

Richard A. Parker has been appointed consulting engineer to the El Paso Gold Mining Co., of Cripple Creek. Mr. Parker was recently elected one of the vice-presidents of the Colorado Scientific Society.

Bradley Stoughton has been elected secretary of the American Institute of Mining Engineers.

E. G. Spilsbury left New York, Jan. 19, for Houston, Texas, to begin the laying out of the work for the proposed new blast furnaces and openhearth plant of the Southwestern Steel Corporation. He expected to be in Texas for a couple of months.

Walter Harvey Weed has been engaged to make a geological examination of the Butte Central mine.

Geo. W. Starr has been appointed superintendent of the Empire and Pennsylvania mines in Nevada county, California.

Mining and Metallurgical Society
of America

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ANNOUNCEMENTS.

New York Section.—A meeting of the New York section will be held at the Chemists' Club, New York, on Thursday, April 17, at 8.15 p.m. The meeting will be preceded by a dinner (informal) at 6.30 p.m.

San Francisco Section.—Regular meetings of the San Francisco section will be held on the first Monday of May, September and December, 1913. Other meetings may be held on call of the chairman.

Bound Volumes.—Bound volumes of the Bulletin of the Society for 1912 may be obtained from the Secretary for the price of $1.50. Any member desiring a complete set of the bulletins for 1912 unbound can obtain it, free of charge, by application to the Secretary.

Ballots.—By order of the Council three important questions are submitted to the membership for ballot on April 1.

1. A proposed plan of union of the Society and the American Institute of Mining Engineers. This was approved unanimously by the council, 15 members voting, on Jan. 14, 1913, and was published in the bulletin of Jan. 31, 1913. The plan now submitted to ballot is the same, save for two alterations in phraseology made in order to clear away certain ambiguities. (See minutes of council meetings on March 13, 1913.) The membership is now requested to vote on a resolution offered as a resolution introduced by the council under the rules. As put to the membership the question is of the nature of a referendum. An affirmative vote will express approval of the plan adopted by the council and will authorize the council to put it into final form, altering the language of the present draft, and details, if

necessary, but not to alter the substance. If the vote be in the affirmative the council will proceed with execution of the plan, which will involve the introduction of amendments to the constitution and by-laws, which must severally be submitted to the membership in the constitutional way, and will be the basis of a final vote.

2. A series of resolutions expressing the opinion of the Society as to oil land legislation. Resolutions upon this subject were sent to the council by both the San Francisco and New York sections. The present resolutions are a composite of the sectional resolutions, together with new matter introduced by the council, and are now offered for ballot under the rules.

3. Amendments to by-laws 4 and 11, which were introduced and adopted at the meeting of the Society on Jan. 14, 1913. The amendment to By-Law 4 abolishes the initiation fee now prescribed, which has not, however, been paid by any member, the membership not yet having attained the statutory number of 250. The amendment to By-Law 11 is to cure defects in the present system of nominating officers and councillors which have become manifest in the experience of the Society.

The above questions are submitted to ballot under date of April 1, 1913, and the polls will remain open until May 1, 1913. By order of the council votes are to be "Yes" or "No." A slip summarizing the requirements of the constitution and by-laws with respect to letter ballots will accompany the ballots.

W. R. INGALLS,
Secretary.

COUNCIL

A meeting of the council of the Mining and Metallurgical Society of America, of which notice was given on Feb. 24, was held at the Engineers' Club, New York, at 5 p.m., on March 13, with Dr. Chance, President, in the chair. The members present were Messrs. Chance, Ingalls, Kemp, Mudd and Munroe. Dr. Chance reported that he held the proxy of Mr. Garrison and Mr. Ingalls reported that he held the proxy of Mr. Leggett.

The Secretary reported that the secretary of the New York section had reported that at the meeting of the New York section on Feb. 13, 1913, D. M. Riordan offered the following motion, which was adopted:

"I move that the council of the Society be requested to formulate an appropriate resolution expressing the sorrow of the Society at the death of John Fritz, who did so much to advance the science of metallurgy in his life and who left a record of which any man may be proud."

It was moved and seconded that the above resolution of the New York section be approved, and that Dr. H. S. Drinker be requested to draft a suitable memorial of the late John Fritz. This motion was unanimously carried.

Mr. Ingalls offered the following resolution:

WHEREAS, The council of the Society has by unanimous vote approved a plan of union of the Society with the American Institute of Mining Engineers, as recorded in the minutes of the council and printed in bulletin No. 56, pp. 2 and 3, Jan. 31, 1913,

AND WHEREAS, This proposed plan of union has been before the members of the Society since Jan. 31, 1913,

THEREFORE, Be it resolved that the proposed plan, as above described, be submitted on April 1, 1913, to the membership for their action by vote upon the following resolution, offered as a resolution presented by the council of the Society:

RESOLVED, That the Mining and Metallurgical Society of America approves the plan of union of the Society with the American Institute of Mining Engineers as printed in the Society's bulletin No. 56, pp. 2 and 3; and instructs the council of the Society to proceed with the measures necessary to effect such union; and further authorizes the council to enter into an agreement with the American Institute of Mining Engineers on the terms of the proposed plan of union, herein described, with the right to alter the language and details thereof without altering the substance.

AND BE IT FURTHER RESOLVED, That the Secretary be directed to issue this ballot on April 1, 1913, and that the membership of the Society be instructed to vote "yes" or "no" upon it.

The above resolution was seconded by Professor Kemp. The Secretary reported that he had received no communications adverse to the proposed plan of union. He reported further that he had written to the members of the council in San Francisco requesting an expression of their opinion, and the opinion of the membership there, and had received replies of favorable tenor. The letters of Mr. Bradley and Mr. Bain were read. After discussion the question was put to vote and was carried by a vote of six in the affirmative to one in the negative.

The Secretary reported communications from members of the council with respect to the oil land resolutions, pending before the council, as directed at the last previous meeting of the council; and read letters from Messrs. Argall, Finlay, Leggett and Kemp, all of which were favorable to the pending resolutions. Mr. Leggett and Professor Kemp suggested trifling amendments of the phraseology of the resolutions, which suggestions were considered. Upon motion, duly seconded, and unanimously carried, the second sentence of the fourth paragraph was amended to read as follows: "Whenever a lease is thus allotted to a bidder in competition with others it shall consist of such an acreage as shall be fixed in each particular case by the secretary. No lease allotted without competitive bidding shall contain more than 320 acres." This amendment corrected an obvious error in language on the part of the committee on mining law.

Upon motion, duly seconded, and unanimously carried, the oil land resolutions, as printed in the bulletin of the Society No. 57, Feb. 28, 1913, pp. 24 and 25, with the amendment here made were adopted and were ordered submitted to a vote of the membership of the Society, the ballot to be issued on April 1, 1913.

The Secretary offered the following rules, stating that their purpose was to regularize the practice in connection with the reports of the minutes of local sections and the publication of the bulletin of the Society:

1. The Society shall publish monthly (and at intermediate times when necessary) a bulletin, which shall be the official record of the proceedings of the Society, and of its local sections. The bulletin shall be published under the direction of the Secretary of the Society and shall contain announcements by the officers, the minutes of meetings of local sections, communications from members, and such other matter as in the opinion of the council or of the officers of the Society may be proper and useful in promoting the purposes of the Society.

2. The regular numbers of the bulletin shall be published on the last day of each month, or as near thereto as is possible, but the council may for reasons of weight delay the publication of any bulletin.

3. Secretaries of local sections shall be responsible for the primary editing of the reports of meetings of their sections and shall deliver to the Secretary of the Society a properly prepared manuscript report, in duplicate, each copy signed by the section-secretary.

4. The Secretary shall file one of these copies among the official records of the Society and shall use the other copy in connection with the preparation of the bulletin.

5. Matter intended for publication in any bulletin must be delivered to the Secretary of the Society before the twentieth day of the month of publication, unless the publication of the regular bulletin has been delayed by direction of the council.

6. The Secretary may, for reasons of weight, withhold matters submitted for publication in the bulletin, other than official announcements by the officers of the Society or by the council; but in the event of such withholding he shall forthwith notify the President and present the case to the council, at its first following meeting, which shall act upon it.

Upon motion, duly seconded, the above rules were unanimously adopted.

A special meeting of the council of the Mining and Metallurgical Society of America was held at the Engineers' Club, New York, on March 13, at 11.30 p.m., the meeting being called by order of the President, without previous notice, for reasons of weight as declared by the President. Dr. H. M. Chance, President, occupied the chair. The members present were Messrs. Chance, Ingalls, Munroe and Mudd. Messrs. Garrison and Leggett were represented by proxy. The total number of members present in person and by proxy was 6, this constituting a quorum. The President stated that in the discussion of the proposed plan of union of the Society and Institute in the meeting of the New York section earlier in this evening, it had appeared that certain features of the proposed plan of union were not clearly understood because of possible ambiguity in the language, although the intention was perfectly clear in the minds of the joint committee which drafted the plan. In order to remove ambiguities that had been remarked it was desirable to clarify the language before submitting the plan to a ballot of the membership as ordered at the previous meeting of the council.

Upon motion, duly seconded, and unanimously carried, the action of the council at the previous meeting on March 13 in adopting a resolution submitting the proposed plan of union to the membership for their vote was rescinded.

Upon motion, duly seconded, and unanimously carried, the first clause of the first sentence of the fourth article was changed to read: "The Society hereafter to make membership in the Institute a prerequisite to election to membership in itself," and in article 9 the second clause was cancelled and the following substituted: "The Society to have the right of independent representation in all public affairs involving action or opinion."

Upon motion, duly seconded, the plan of union as published in bulletin No. 56, Jan. 31, 1913, pp. 2 and 3, with these amendments, was unanimously adopted.

Upon motion, duly seconded, the following resolution was unanimously adopted:

WHEREAS, The council of the Society has by a unanimous vote approved a plan of union of the Society with the American Institute of Mining Engineers, as recorded in the minutes of the council and printed in bulletin No. 56, pp. 2 and 3, Jan. 31, 1913,

AND WHEREAS, This proposed plan of union has been before the members of the Society since Jan. 31, 1913,

THEREFORE, BE IT RESOLVED, That the proposed plan, with the amendments adopted at this meeting, be submitted on April 1, 1913, to the membership, accompanied by the proposed agreement, for their action by vote upon the following resolution, offered as a resolution presented by the council of the Society:

> RESOLVED, That the Mining and Metallurgical Society of America approves the plan of union of the Society with the American Institute of Mining Engineers as printed in the Society's bulletin No. 58; and instructs the council of the Society to proceed with the measures necessary to effect such union; and further authorizes the council to enter into an agreement with the American Institute of Mining Engineers on the terms of the proposed plan of union, herein described, with the right to alter the language and details thereof without altering the substance.

AND BE IT FURTHER RESOLVED, That the Secretary be directed to issue this ballot on April 1, 1913, and that the membership of the Society be instructed to vote "yes" or "no" upon it.

There being no further business the meeting was then adjourned.

W. R. INGALLS,
Secretary.

I. THE SOCIETY AND THE INSTITUTE

The plan for a union of the Society and the Institute, adopted by the council of the Society on Jan. 14, 1913, and by the council of the Institute on Jan. 23, 1913, and amended at a special meeting of the council of the Society on March 13, 1913, is as follows:

1. The Society to become the Mining and Metallurgical Society of the A. I. M. E., the Society preserving its integrity and organization.

2. The Society to preserve in its insignia the letters M. M. S. A.

3. The Society to continue its studies of professional and professional-political questions through committees and otherwise as at present.

4. The Society hereafter to make membership in the Institute a prerequisite to election to membership in itself; to abolish the provisions of its constitution and by-laws pertaining to initiation fee, life membership and honorary members; to suspend temporarily its by-law relative to the election of members and permit its executive committee, in conference with the membership committee of the Institute, to elect out of the Institute members meeting the qualifications of the Society, their election to be consummated by the executive committee of the Society, this suspension of the membership by-law of the Society to last for only three months after the date of the union of the Society and the Institute, or for such additional time as the council of the Society may fix.

5. The Society to urge its members who are not members of the Institute to become such. Such members becoming members of the Institute to be exempt from the initiation fee of the Institute. Resignation of membership in the Society with preservation of membership in the Institute to be permitted.

6. The Society to amend its by-laws so as to make its annual dues $20 per member, this to cover the dues of its members as members of the Institute. The Society to pay into the treasury of the Institute $15 per member per year, except as hereinafter stipulated. The Society to retain in its treasury such fund as will be necessary for the award of its annual medal; to accumulate, maintain, and retain an additional surplus of $2,500; the Society to turn over to the Institute all annual surplus over actual expenses and the accumulation and maintenance of the reserves herein specified.

7. The Society to incorporate in its by-laws a provision that $10 shall be deducted from the annual dues of members who are, or may become, life members of the Institute; the Society to pay into the treasury of the Institute only $5 per annum on account of such members; the Society not to pay anything into the treasury of the Institute on account of members elected during the last three months of a year as dues for that year, or on account of members whose dues to the Institute have already been paid.

8. The Society to manage its own affairs, except in the matter of publishing its proceedings, which publication shall be done by the Institute. The Institute to publish in its bulletin all of the proceedings of the Society as communicated by the officers thereof, the form of such publication to be satisfactory to the council of the Society. The Institute to have the right to republish in its transactions such part of the proceedings of the Society as the governing body of the Institute may desire so to republish. All publications of the Institute to be sent to all members of the Society.

9. The Institute to be the representative organization in all public affairs not involving the action or opinion of the Society; the Society to have the right of independent representation in all public affairs involving action or opinion.

10. The Society and the Institute to avoid duplication of committee work, i.e., if one has appointed any committee, the other shall not appoint a similar committee (except as to internal affairs).

11. The Society and Institute to adjust differences that may arise respecting representation, committee work and meetings of local sections by conference between their respective governing bodies.

12. The Institute and the Society, each to make the changes in its constitution and by-laws that may be necessary to carry out the terms of this agreement.

COMMUNICATION

W. R. Ingalls.—I have been requested by a member of the Society to explain why under the proposed plan of union of the Society and the Institute it was provided that the Society should collect the dues of both the Society and the Institute, handing over to the Institute its share. The committee had in mind (1) that this would emphasize the idea of union; (2) that most members would prefer to make one settlement of dues, rather than two; (3) that it would insure living up to the agreement that hereafter membership in the Institute shall be prerequisite to membership in the Society. It will be impossible for anybody to join the Institute for the purpose of obtaining admission into the Society, and having accomplished that, drop his membership in the Institute. The plan of union permits anybody to drop out of the Society and remain in the Institute, but not to drop out of the Institute and remain in the Society. The proposed manner of collecting the dues effectually insures the intention of the joint committee.

MEETING OF THE SOCIETY

A meeting of the members of the Mining and Metallurgical Society of America, of which notice was given in bulletin No. 57, Feb. 28, 1913, was held at the Engineers' Club, New York, on Thursday, March 13, at 8 p.m., with Dr. H. M. Chance, President, in the chair.

The members present were Messrs. Catlin, Chance, Cowles, Corning, Dufourcq, Ingalls, Jennings, Kirby, Munroe, Mudd, Norris, Peele, Pomeroy, Stone, Westervelt and Wethey. The Secretary held the proxies of five members, which were examined by the President and declared to be in proper form. The President then announced that there were 16 members present in person and five by proxy, a total of 21, which constituted a quorum.

The minutes of the meeting on Jan. 14, 1913, were declared by the President to be approved as printed in bulletin No. 56, no objections having been received.

The President announced that this was a special meeting for further action upon the amendments to the by-laws introduced and passed at the meeting of the Society on Jan. 14, 1913, and stated that the usual 30 days' notice of the meeting had been omitted for reasons of weight, and that by the terms of the by-laws no other business could be transacted at this meeting except the business for which the meeting was called.

The Secretary read the pending amendments to the by-laws, as follows:

By-Law No. 4.

Strike out by-law No. 4, as follows: "There shall be an initiation fee of twenty-five dollars for each new member after the total membership shall have reached two hundred and fifty."

By-Law No. 11.

Three months before the annual meeting, the secretary shall send a nomination ballot to each member of the Society in the districts for which new councillors must be elected, with the request that he shall nominate three members, in such manner as the council may direct, as candidates for councillor to represent his district; and shall send a nomination ballot to each member of the Society entitled to vote, with the request that he shall nominate one member for president, one for vice-president and one for secretary. Nominations shall be received for 20 days, when the polls shall be closed and the ballots counted by the Secretary. Sixty days before the annual meeting the Secretary shall issue a ballot, containing in and for each of these districts not less than three names, and for the offices of president, vice-president and secretary, each, not less than three names, which shall be in each case those receiving the largest number of nominating votes. Provided, however, that the ballot may comprise less than three names for any office if less than three persons have been nominated for that office; and, moreover, that persons receiving less than seven votes for an executive office and less than three votes for councillor may be disregarded, and provided further, that no person may stand for more than one office, and when votes are cast for the same person for more than one office he shall be placed on the ballot only for that office for which he has the largest number of votes. The ballot prepared as thus directed shall be mailed to each member of the Society entitled to vote, who may vote for one councillor in each district, having the right to substitute names not on the list, and to cast not over three votes for a single candidate, provided that the total number of votes cast by such member shall not exceed the total number of vacancies to be filled; and who may cast one vote for president, vice-president and secretary, respectively, having the right to substitute names not on the list. The ballot shall be signed, sealed and voted as prescribed in by-law 16.

By a unanimous vote the amendment striking out by-law No. 4 was further amended to provide for the renumbering of the subsequent by-laws in consecutive order. No further amendment with respect to by-law No. 11 was offered.

There being no further business the meeting was then adjourned.

W. R. INGALLS,
Secretary.

MEETINGS OF SECTIONS

NEW YORK.

The March meeting of the New York section was held, after an informal dinner at the Engineers' Club on Thursday evening, March 13, at 9.15 p.m. The meeting was called to order by the chairman, Mr. Stone. In the absence of the secretary, Mr. Wethey was appointed secretary of the meeting. The members present were: A. H. Cowles, C. R. Corning, H. M. Chance, R. M. Catlin, E. L. Dufourcq, W. R. Ingalls, S. J. Jennings, E. B. Kirby, H. S. Munroe, S. W. Mudd, R. V. Norris, R. Peele, W. A. Pomeroy, G. C. Stone, W. Y. Westervelt and A. H. Wethey.

The Chairman.—The minutes of the last meeting having been published in the Society's bulletin, unless there is some objection they will stand approved as printed.

[No objection was offered and the minutes were declared approved.]

At the last meeting we were discussing the proposed affiliation with the Institute. I do not think that this subject has been entirely exhausted.

S. J. Jennings.—Possibly the chairman can indicate from the discussion of the details whether the principle is approved.

The Chairman.—No. There has been no discussion of the principle. It was apparently conceded that the general principle is desirable, though it was not so stated.

S. J. Jennings.—I move that the principle of amalgamating the Society with the Institute be approved. [Motion seconded by Mr. Wethey.]

C. R. Corning.—Let us have this thing clearly defined. Mr. Jennings wishes amalgamation, others have moved a union and others an affiliation with the Institute.

S. J. Jennings.—I mean the principle as laid down by the two committees. I mean the underlying principle. It is to be a union of some sort.

C. R. Corning.—I think a great many of us would be glad to see a closer relationship, but there are a larger number who would be averse to amalgamation.

A. H. Wethey.—We do not want to lose our identity.

C. R. Corning.—This matter, as I said at the last meeting, was considered carefully by some of the members of the Committee of Five (of the Institute). We felt at the time that it was wise and desirable to enter into closer relations with the Institute, but we were not prepared to agree to absorption or "a union" as one of the technical papers put it. We were willing to affiliate and see how the thing would work. If after six months a closer relationship is desirable, there is absolutely no objection to creating it. The Institute has been through a period of stress and various difficulties, and while it has got an entirely new policy, new ideas, and a new set of officers, its reformation has not yet been proved. We all hope it will be proved. This Society was formed as an independent society. It has been very successful, it is respected, and we want to be a little cautious until things are proved.

Why should we turn over our surplus beyond a certain point? This morning I was looking over a Canadian Institute paper. It was a nice paper. They offer small prizes for papers. This Society has a surplus. Why not give small prizes? We are precluded from doing so by having to turn over our surplus to the Institute. We turn over half of our dues to the Institute. Why should the Institute do our printing? We might be able to have it done elsewhere somewhat cheaper. I am not at all sure that the Transactions of the Institute are printed as cheaply as they can be, and that a great deal of money is not wasted. I should personally like to see one society, but I am afraid it cannot be brought about at the present moment.

H. M. Chance.—I think we are not all bearing in mind the objects of the organization of our Society and perhaps we are losing sight of the causes that led to its organization, and of the objects we sought to obtain by its organization.

The proposition was made to organize a new society at a time when there seemed to be no possible help for the American Institute of Mining Engineers. It had ceased being a representative professional organization. However, a great number of the charter members of this Society thought it would be desirable to organize as a society within the Institute. Negotiations were opened to permit us to organize in that manner. These negotiations were met coldly and we received little encouragement. Finally at the time we organized it was decided to make one more effort to organize as a society within the Institute. We appointed a committee to meet the council of the Institute. That committee waited on the council and they gave us no assurance that the permission would be granted. So we had only one thing left open to us, viz., to organize a new society, which we did.

Now the object underlying the organization of this Society was that it should be a benefit to the profession. I think we make a mistake in looking upon it as being for ourselves alone. We must not think only of its value to us personally. We enjoy its meetings and the freedom from all restraint which we had not enjoyed heretofore, and we may forget that as members of the Society and as members of the Institute and as members of the profession, it would be for the best interest of the profession that the Society be merged. The fact I think is patent to any one that a union will be beneficial to both. We will help the Institute and it will help us.

At the time of the organization of our Society we accepted members without the obligation of paying any initiation fee. Under the plan of union it is contemplated to throw the doors open again, to do away with the initiation fee. We want to make it easy for a great many gentlemen to become members without the payment of an initiation fee and without having to subject themselves to the annoyance, perhaps, of formally applying for membership and having their records and application submitted to the whole Society as is customary. At the time the Society was organized there were probably 100 or 150 men who had been invited to become charter members of the Society but who refrained from joining for fear that the new Society would be adverse to the Institute. Some of these gentlemen have since joined but many have not. It is very desirable that we should get all those who are qualified by experience and reputation and who were not willing to accept election before because of their loyalty to the Institute. That is the object that underlies the proposed amendment dropping the provision for an initiation fee of $25. Some of these gentlemen might not now feel disposed to pay the $25. Then again, the Society under this plan will not need the money. Our expenses will be largely reduced. If we do not merge we must pay the Secretary and the officers, and our expenses are going to grow in arithmetrical and geometrical proportion. We are only in our fine financial condition because of the generosity and self-sacrifice of some of the members. The Secretary has given his services gratuitously and office rent free. If we are going to continue with a membership of 250 we will have to raise our dues to $25 or $30. If we really want useful and prosperous local sections we have got to do something to assist them. We ought to have local sections at Butte, Salt Lake City, Denver, Houghton, and other places. Our present membership does not permit that. If we combine we will have the benefit of a largely increased membership. The Institute on its side will benefit in many ways. It is generally admitted that the existence of the Society has produced some friction and misunderstanding, which will be removed. Under the plan of union we shall have our own independent body, our own charter, our own officers, the right to elect our members and we shall be almost as independent as though we were not connected with the Institute.

C. R. Corning.—What legal provision has the Institute for making this arrangement?

G. C. Stone.—The new constitution gives the directors the right to affiliate.

C. R. Corning.—Until they make the proper arrangement I do not think it would be wise for us to join in anything but an affiliation. I know how loosely things in the Institute were run. I do not think it is a good thing to do anything except what they are allowed to. If the Institute chooses to make provision for closer relationship it should do so.

W. R. Ingalls.—The plan of union provides that each body shall make the necessary changes in its constitution and by-laws. The Society has to do that as well as the Institute.

C. R. Corning.—The proper thing would be to make the changes first.

W. R. Ingalls.—Certainly not. Changes of constitution and by-laws in each case involve long procedure and neither party ought to, or would, inaugurate such changes until after the principle has been accepted.

H. M. Chance.—The question of the difference between affiliation and union has been thrashed out, and by putting in the amendment for affiliation it would hardly mean anything different from what it would be if it said union. Is not a union an affiliation? It is a union in which neither body loses its identity. Both preserve their independence of action except in the case of representation, as for instance at the Panama Exposition, the International Geological Congress, etc. At such meetings where we would be asked to send delegates the Institute would be the recognized representative.

C. R. Corning.—The Institute is precluded from sending a committee to represent it, and if we join the Institute we are precluded from being represented in such matters.

H. M. Chance.—If the Institute cannot be represented, the Society can be.

C. R. Corning.—That is not so stated in the plan. It should be so worded.

H. M. Chance.—The statement in the plan was clear enough to us. The joint committee held two long conferences and a sub-committee had a third. We had a perfect understanding and everything was entirely clear even though some things may not have been so expressed, as some members here seem to think. Mr. Corning implies that this union proposes a practical abandonment of the Society. If the officers of the Society who are advocating this plan were of that opinion they would not entertain the project for a moment. We believe that union will be followed by a large increase in the membership of the Society and will increase its prestige and usefulness. I do not think it can have any other effect. We have shown the members of the Institute that the Society is capable of doing work that the Institute cannot. The majority of them are reasonable men. Some will never be convinced, but they are in the minority. We shall gain an influence and achieve a position that it would otherwise take us years to reach and that we might never reach.

The conference committee of the two bodies having reached an agreement, and I may say that in the discussion there was very little difference of opinion, I feel that the representatives of this organization will stand or fall with this proposition. If it is turned down by our Society it will be equivalent to a vote of lack of confidence in the officers of the Society. It will be nothing more, and nothing less, and the Society will be hampered very seriously in attempting to carry through any modification. The directors of the Institute will be right in saying, "You cannot agree among yourselves. We cannot discuss the matter of another agreement for it will be turned down in the same way."

R. Peele.—Is the joint committee still in existence? Cannot that committee be reconvened to make amendments?

H. M. Chance.—I do not think the committee was ever formally discharged. It was a committee of the council of the Institute and the executive committee of our Society. The executive committee of our Society has since changed in its personnel.

C. R. Corning.—(Reading) "The Society to make membership in the Institute a qualification for membership in itself."

The members of the Society who are not members of the Institute have got to be expelled.

H. M. Chance.—It does not mean that at all. We cannot do that. That provision obviously applies only to future members.

C. R. Corning.—Why not make it say what it means?

H. M. Chance.—Its meaning is patent as it stands. Any other construction would be retroactive and unconstitutional. The document that is before us is simply a statement of terms. It is not phrased in final language.

R. Peele.—This is a very serious thing. There is some dissatisfaction about a few of the terms as outlined by the committee. It does not appear that there is any particular haste to consummate this matter. Would it not be wise to refer the matter of framing the terms back to the committee for further consideration so as to meet the objections raised?

C. R. Corning.—I make that motion.

H. M. Chance.—Before the motion is put I would like to explain that the Council has passed a resolution to submit to the members of the Society by letter ballot, the agreement that has been reached between the joint organizations. I will ask Mr. Ingalls, the Secretary, to inform you the terms of the resolution that will be offered. [Mr. Ingalls read. See minutes of council meeting.] This resolution provides for issuing the ballot on April 1. By this we shall get the widest expression of opinion as to whether the members generally favor the proposed action. The council passed that resolution for the purpose of getting such expression of opinion and if favorable, getting instructions to carry out the plan and start the amendments that will be necessary.

C. R. Corning.—There are a lot of things here. I think this matter should be referred back.

H. M. Chance.—It is not within the power of this Section to refer back to the council any proposition which the council has submitted. The council stands or falls by it.

W. R. Ingalls.—The plan that is before our Society is essentially the proposition of the representatives of the Society. It has been approved by our council. We cannot with any grace go back to the Institute and say we want to change it. It is open to the membership to support us or repudiate us. The council will stand or fall by the proposition.

W. L. Pomeroy.—In view of the discussion that has taken place and the uncertainty in the minds of a number of us as to what was in the mind of the council, might we not suggest that the council appreciating the state of mind of some of us, redraft this?

C. R. Corning.—This resolution should go out to the Society in its final form. I object to the resolution which permits alteration of the wording.

R. Peele.—May I ask whether the Society's name will undergo any change?

The Chairman.—It will be called the Mining and Metallurgical Society of the American Institute of Mining Engineers.

R. Peele.—I think that is an unfortunate and cumbersome title. Will it be necessary to say "of the American Institute of Mining Engineers"?

W. R. Ingalls.—We want it. We want to be identified with the Institute. It carries out our idea of an actual union. Its length will be no trouble. In common practice everybody will refer simply to the "Mining and Metallurgical Society" just as they do now.

H. S. Munroe.—If we gave up our own name we should give up something we regard as valuable and something which distinguishes us.

A motion requesting the council to reconsider the wording of the proposed plan of union was carried. (Vote 7 to 5.)

C. R. Corning.—I would like to present an alternative to the proposition of the council, as follows:

1. The Society to become the Mining and Metallurgical Society of the American Institute of Mining Engineers, the Society preserving its integrity and organization.
2. The Society to preserve its insignia "M. M. S. A."
3. The Society to continue its professional and professional-political studies and other activities, as at present.
4. The Society to make membership in the Institute a prerequisite for the admission of new members of itself after affiliation shall have been accomplished.
5. Resignation of membership in the Society with preservation of membership in the American Institute of Mining Engineers is to be permitted. Equally so, is resignation from the American Institute of Mining Engineers and preservation of membership in the Society to be permitted.

6. The Society is to manage its own affairs in all particulars:
Except that in the matter of its publications the Society will make them conform in the quality of technical execution to the general type of the Transactions of the American Institute of Mining Engineers. In size they shall conform to those Transactions.

7. All articles or other matter which the Society desires to publish shall first be submitted to the proper authority of the Institute, and in that manner afford opportunity to the Institute to include this matter in its own Transactions and publications. If, after a period of one month, no reply has been received concerning the decision reached in such matters by the Institute, the right of the Institute to publish such matter shall lapse and the Society shall be entitled to publish independently and under its own name, unless by mutual agreement some other arrangement be arrived at. The Institute, however, shall always have the right to republish in its own Transactions, but not otherwise, any material issued by the Society.

8. The respective functions of the two Associations in the matter of representation in public affairs shall be a matter of agreement between the Council of the M. and M. Society and the Board of Directors of the Institute.

9. The Society and the Institute shall, as much as possible, avoid duplication of Committee work. That is, if one has appointed any Committee the other shall not, without good cause, appoint a similar Committee. This preservation, however, does not affect Committee work concerning internal affairs.

10. The Society and the Institute to adjust differences that may arise respecting representation, committee work and meetings of local sections by conference between the executive committee or board of directors of the Institute and council of the Society.

11. The Institute and the Society each to make the changes in their constitution and by-laws that may be necessary to carry out the terms of this agreement.

12. The Society shall pay to the Institute, out of its funds, an annual contribution for each of its members not a member of the Institute equal to the dues he would have paid if a member.

13. No member of such affiliated Society who is not also a member of the Institute shall have the right to vote or hold office in the Institute or attend business meetings; but he shall have all the other rights of membership.

14. Each Society shall elect its own officers and retain and maintain its own constitution and by-laws.

15. Both societies shall have the right to assess dues on their own members and shall have the exclusive control of all funds so raised. In addition the Institute shall have exclusive control of all funds paid it by the Society as annual contribution for the members of the Society who are not members of the Institute.

16. All members of the M. and M. Society shall receive all of the publications of the Institute on the same terms as the members of the Institute.

The Society will retain its right to issue special publications under its own name, which must be announced in the bulletin of the Institute. in which case all the members of the Institute shall be entitled to receive such publications at cost of issue to the Society.

17. The connection between the Society and the Institute may be terminated by either giving six months' notice and settling all indebtedness.

H. S. Munroe.—Mr. Corning's alternative has two unfortunate provisions. The first is the clause permitting a member to resign from the Institute and retain membership in the Society. Notwithstanding that, we have to pay dues to the Institute for that member. If 15 or 20 men wanted to wreck the Society they could force us to pay their dues. The second thing is the delay in the publications. I think it is very important that our discussions should be published promptly. Otherwise we could not discuss matters here and in San Francisco simultaneously.

S. J. Jennings.—Perhaps Mr. Corning will explain the difference between the plans and point out what in his opinion the advantages of his are.

C. R. Corning.—In the first place we are not a collecting agent. Under this arrangement we do not guarantee dues of our members in the Institute. Under the other plan we are obligated to pay the dues.

H. S. Munroe.—In many respects the proposition of the council is vastly better than yours.

[Here followed some further discussion respecting ambiguities in the plan adopted by the council, some members holding that there was no ambiguity; others the opposite. The criticism in this respect pertained chiefly to the sentence stating that membership in the Institute should be a qualification for membership in the Society; and to the article respecting representation in public affairs. Members of the council who were present stated that the language of the statement was by no means final, that the intention of the joint committee was that membership in the Institute should be a prerequisite to membership in the Society only with regard to future elections; and that its intention was to preserve the right of the Society to representation in public affairs involving action or the expression of opinion.]

H. M. Chance.—I think it would be possible for our section to request the council in submitting its resolution to accompany it by an explanation of those points on which there seems to be a misunderstanding. We have no right as a part of the joint committee to revise anything but we have a right to explain anything where there may be a misunderstanding.

C. R. Corning.—I make a motion that the council be requested to delay the letter ballot until such time as this proposal can be put into proper shape and all ambiguities eliminated.

G. C. Stone.—The council could revise it and send it back to the directors of the Institute and I am sure that there would be no question at all but that it would be accepted.

On motion of Mr. Pomeroy the meeting adjourned at 11.20 p.m.

A. H. WETHEY,
Acting Secretary of Section.

PERSONALS

The following papers by members of the Mining and Metallurgical Society were read before the recent meeting of the Canadian Mining Institute: "The Development and Problems of the Yukon," by Henry M. Payne; "The Treatment of Gold Ore at the Dome Mine, South Porcupine," by C. W. Merrill; "Some Notes on Monel Metal," by William Campbell; "Investigations of the U. S. Bureau of Mines in Metal Mines," by George S. Rice.

B. Britton Gottsberger has undergone two operations for appendicitis and is expected to recover.

Prof. H. O. Hofman has been appointed as metallurgical examiner for the U. S. Civil Service Commission. It will be his duty to compare the qualifications of candidates for metallurgical positions in the Government service and to rate them accordingly.

W. R. Ingalls delivered a lecture to the members of the Lackawanna Chemical Society on the occasion of their annual dinner on Feb. 27 last.

MEMBER ELECTED IN MARCH, 1913

Graton, Louis Caryl........................Cambridge, Mass.
Sec'y and Treas., Copper Producers' Assn.; also Prof. of Mining Geology, Harvard University.

Mining and Metallurgical Society of America

Vol. VI April 30, 1913. No. 4

ANNOUNCEMENTS.

Delay in Publication.—Although this bulletin is dated April 30, 1913, its publication was delayed by order of the Council to permit the reporting of the ballot counted on May 1.

New York Section.—A meeting of the New York section will be held at the Chemist's Club, New York, on Thursday, May 15, at 8.15 p. m. The meeting will be preceded by a dinner (informal) at 6.30 p. m.

San Francisco Section.—Regular meetings of the San Francisco section will be held on the first Monday of May, September and December, 1913. Other meetings may be held on call of the chairman.

Bound Volumes.—Bound volumes of the Bulletin of the Society for 1912 may be obtained from the Secretary for the price of $1.50. Any member desiring a complete set of the bulletins for 1912 unbound can obtain it, free of charge, by application to the Secretary.

Report of the Committee on Mining Law.—In this bulletin is presented the report of the committee on mining law, of which Mr. H. V. Winchell is chairman. No action upon this report has yet been taken by the council of the Society, except to order its printing, which has been done for the early information and discussion of members. It is hoped that members will engage in a full discussion of this important matter. The committee submitted along with its report a file of correspondence with engineers and experts in reference to the subject. The council has directed that the material parts of this correspondence be printed in the bulletin of the Society. This will be done in a subsequent number.

Ballot.—The ballot issued to members on April 1, 1913, to be canvassed on May 1, 1913, was as follows:

1. The proposed plan of union of the Society and the American Institute of Mining Engineers, as printed in the So-

ciety's bulletin No. 58, and specifically upon the following resolution offered by the Council:

RESOLVED, That the Mining and Metallurgical Society of America approves the plan of union of the Society with the American Institute of Mining Engineers as printed in the Society's bulletin No. 58; and instructs the council of the Society to proceed with the measures necessary to effect such union; and further authorizes the council to enter into an agreement with the American Institute of Mining Engineers on the terms of the proposed plan of union, herein described, with the right to alter the language and details thereof without altering the substance.

2. Upon the adoption of the oil land resolutions introduced by the San Francisco and New York Sections and amended and adopted by the Council at its meeting on March 13, 1913.

3a. Upon the amendment to by-law No. 4 passed at the meetings of the Society on Jan. 14 and March 13, 1913.

3b. Upon the amendment to by-law No. 11 passed at the meetings of the Society on Jan. 14 and March 13, 1913.

The President of the Society appointed F. W. Parsons and A. L. Walker tellers to count this ballot, with H. H. Knox and L. D. Huntoon as alternates.

W. R. Ingalls,
Secretary.

Report of Tellers.—The tellers appointed to count the ballot of April 1-May 1, 1913, reported as follows:

H. M. Chance, *President.*

Sir:

We beg to report that we have this day canvassed the ballot issued Apr. 1, the Secretary having delivered to us 145 signed ballots received from members eligible to vote, together with checked list of the members, all being in conformity with by-law 16 of the Society.

We report that on question 1 there were 126 votes in the affirmative and 18 in the negative. On question 2 there were 121 votes in the affirmative and 13 in the negative. On question 3a there were 128 votes in the affirmative and 12 in the negative. On question 3b there were 140 votes in the affirmative and one in the negative.

The number of members eligible to vote was 221.

Respectfully submitted,

Floyd W. Parsons,
Arthur L. Walker,
Tellers.

New York, May 1, 1913.

The tellers appointed to count the ballots of April 1-May 1, 1913, having reported that the majority of the votes cast were in favor of the resolution offered by the council, appearing as question No. 1 on the ballot, I declare said resolution to have been adopted and to be the formal action of the Society.

The tellers having reported that the majority of the votes cast were in favor of the adoption of the oil land resolutions appearing as question No. 2 upon the ballot, I declare said resolutions to have been adopted and to be formal action of the Society.

The tellers having reported that a majority of the votes cast were in favor of the amendments to by-laws 4 and 11, appearing as questions 3-a and 3-b on the ballot, I declare said amendments to by-laws to have been adopted and to be the formal action of the Society.

H. M. CHANCE,
President.

Philadelphia, May 1, 1913.

REPORT OF COMMITTEE ON ANNUAL MEDAL

The undersigned were instructed by the council of the Mining and Metallurgical Society of America to secure designs for the gold medal authorized by vote of the Society. We respectfully submit the accompanying design furnished by Tiffany & Co., of this city. On the face of the medal is a female figure which may be interpreted as personifying science or knowledge breaking through the rock of ignorance or prejudice and exhibiting in her right hand a crystal which may be considered as representing truth. On the obverse of the medal are two panels in which may be inserted the name of the recipient of the medal and the year of award.

The original vote by which the medal was authorized specified that the medal should have a value of $100. We find, however, that it will cost about $15 each year to make the necessary inserts of name and date in the die and $5 for a case, which will reduce the amount available for the medal to $80. Even if we interpret the value of $100 to refer to the medal alone, this will make the medal smaller than is desirable. It is a question, however, whether we are authorized under the terms of the vote to go beyond the net sum of $80 above mentioned.

In order to clear up this uncertainty and to permit us to provide for a larger medal, we recommend that the matter be again submitted to vote and that the amount to be expended on the medal be left to the discretion of the council. We enclose photographs showing the size of medal that can be obtained for $100 and $150, respectively, including the cost of inserts for the die and a case for the medal. In addition to these it may be desirable to consider furnishing a bronze replica of the medal to the recipient thereof, or an engraved diploma, either or both of which would increase the value of the gift and also the cost to the Society.

Respectfully submitted,
HENRY S. MUNROE, *Chairman.*
ARTHUR L. WALKER,
J. F. KEMP.
Committee on Annual Medal.

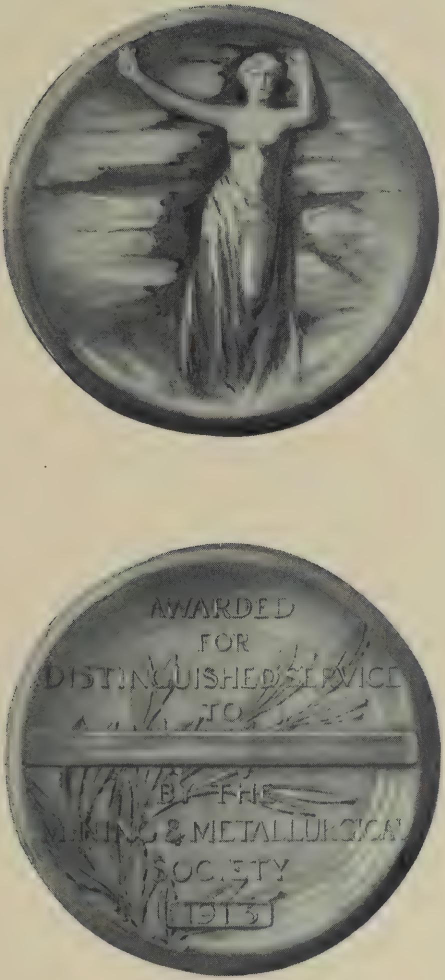
New York, Apr. 14, 1913.

REPORT OF THE COMMITTEE ON MINING LAW

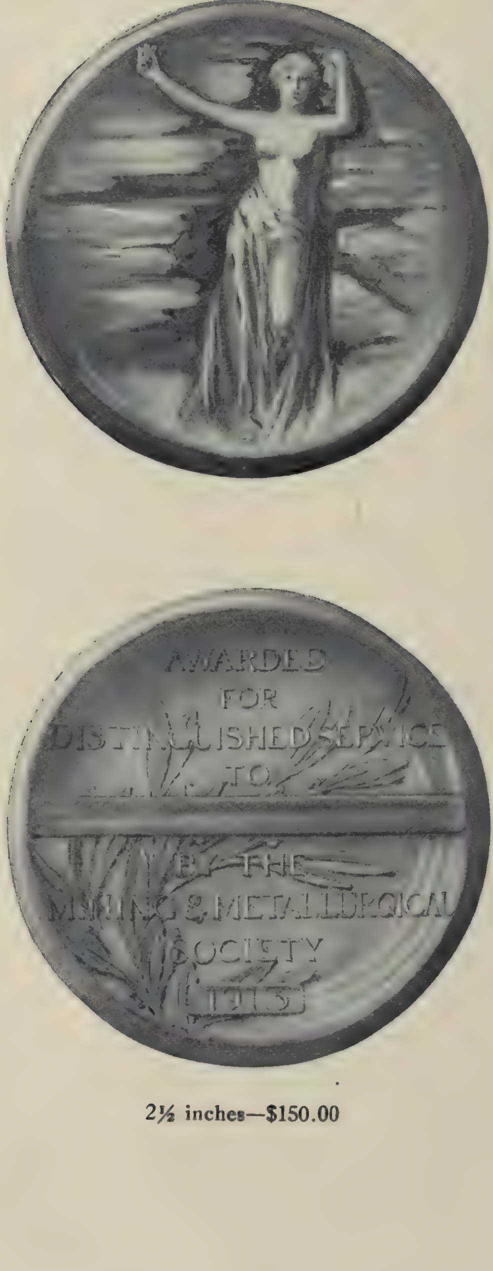
Revision of the United States Mining Law.

No argument is needed to convince a man of the importance of his own chosen profession. Familiar with its traditions and its history, knowing its progress, and having himself contributed to its development, he is inspired by the greater achievements of his colleagues and is impressed with its importance in human affairs. It is possible, however, to be so engrossed in the details and routine of every-day work as to lose the perspective of the profession as a whole, just as a spectator in the grandstand who knows nothing of the technique of a horse race may yet have a much more comprehensive view of its progress and the conditions surrounding it than any one of the scientifically trained contestants. Thus, even when it is generally realized that there is something wrong with the body politic, very few members of that body are equal to the task of diagnosing the trouble and prescribing the proper remedy.

Even with a widespread feeling that our present system of mining law is defective, and a general demand for its revision, it would still not be surprising if it should develop that mining engineers have not as yet united in a concrete, well-developed conviction as to the remedies indicated, and the course of treatment to be adopted. It will be admitted that it is not an easy task to cover all conditions and all minerals in all lands and under different climes with one statute. It may be possible, however, to agree finally upon some of the fundamental principles which are most wholesome for the mining industry and



2¼ inches—$100.00



2½ inches—$150.00

which should find expression in the laws under which it may be inaugurated and conducted.

It should be stated at the outset that the mining laws referred to in this discussion are those which concern the title or possession of minerals and ores, and the lands in which they are found, as distinguished from mining regulations which govern the operation of mines and the relations which exist between labor, landed proprietor and the government.

Proprietorship of Ores and Minerals.—Different fundamental conceptions as to the title to ores and minerals are developed in the laws of various countries. Indeed, the progress of human civilization is said[1] to find an expression in the mining laws from time to time enacted by different governments. Since ores are valuable only after they have been severed from their birthplace in the ground, and adapted for the use of man, from time immemorial a difference has been noted between a title to land and that to the mineral wealth which the land contained. Lands might be granted or leased, but the metallic treasures beneath the surface were subject to the separate control and disposition of the reigning authority. Especially was this true of the metals gold and silver, which were wholly the property of the crown "for the purpose of coinage and to support its dignity"[2] in nearly all European countries; and in many of them it persists, at least in theory, to the present day. This regalian right "followed the principles of the civil law, by which it was established that the ownership of all lands was primarily vested in the state", and that "all mines of gold and silver in public lands belong to the state or sovereign as a part of the sovereign patrimony; whence it followed that the right of severance could be exercised" and the minerals and land granted separately. By the rule of the common law from the earliest time the owner of the soil owned all beneath it with the limitation only that royal mines belonged to the crown.[3] In many of the royal grants to the colonies forming the original thirteen states there was an expression of this theory of regalian right, and a reservation of a fixed portion of all the royal metals discovered.[4] The Virginia charters reserved likewise one-fifteenth of all copper. It is only occasionally and for brief periods of time, however, that we find governments or monarchs attempting to extend their royal rights over the baser metals and coal (although the salt deposits are still held as government monopoly in several countries).

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[1] Hoover's "Agricola," Historical Note on the Development of Mining Law, p. 82 *et seq.*

[2] Rogers, "Law of Mines, Minerals, etc." 2d Ed., p. 175.

[3] Snyder on Mines, 1, pp. 5-6.

[4] Snyder, 1, p. 11.

In the United States we have two different kinds of sovereign proprietorship of minerals and mining rights, state and federal. The original thirteen states derived their rights prior to the formation of the federal government. Other states have at various times and in different ways acquired rights from the federal government.

The mining laws which are the subject of this discussion are those federal statutes which control the prospector and miner in discovering and acquiring title to deposits upon the public domain in the states and territories and possessions which come within the scope of such laws. It is known to every intelligent dweller upon this continent that by far the largest part of our gold, silver, copper and lead comes from the mining states, west of the Missouri River, and the importance of legislation which will encourage and promote the discovery and development of more mines is emphasized by every political economist. The best mining laws are those which result in the greatest good to the greatest number for the greatest period of time, and which lead to the largest output and consumption of mineral products with the smallest amount of waste. It is to the interest of all the people to see that such laws are enacted; but since the people at large are not so well versed in those matters as the mining men themselves, it is the latter who should take the initiative whenever new conditions create the necessity for new laws.

Necessity for Revision.—As to the need for mining law revision there seems to be no doubt whatever. Congress has been memorialized by our greatest statesmen and economists, by presidents, cabinet officers and directors of the land department and of the geological survey, associations of commercial and mining men in all parts of the land have voiced the necessity, and committee after committee has formulated its suggestions and presented them to a heedless congress. Mining journals have teemed with articles upon the subject; prominent attorneys and jurists have discussed it; the expensive and sometimes disastrous apex litigation in almost every mining district, where the mine proprietors have not prudently by mutual agreement nullified the extralateral right provision of the statutes under which their title was acquired, has attracted widespread attention to some of the worst defects in our present law until scarcely anyone attempts to defend it; and yet nothing is done.

It is often a simple matter to criticize and to point out defects, but a far more difficult task to suggest constructively what should be done to improve the situation. If, however, we are able to single out weak points and hold them up to the light of criticism we shall at least have performed a work necessarily preliminary to that of finding the remedy. Let us first, therefore, consider some of the bad features of our present law.

Lack of Protection to Prospectors.—It is a custom which, like many others, has been sanctioned by legal enactment in many countries, to reward the discoverer of a new vein or mineral deposit, or a new mining district. Sometimes this reward is offered in the nature of a cash bonus, but it more frequently takes the shape of permission to locate for himself a larger claim than is allowed to subsequent locators. In the attempt to incorporate this principle into our mining law every right was made dependent upon a discovery of ore in place, and until such discovery the prospector has no possessory rights. Instead of being permitted and authorized by law to stake out his ground wherever he chooses on the public domain (in many countries this right is extended also to private estates, and the owner is compelled to grant a prospecting permit to any applicant unless he wishes himself to explore his own ground) and there, under proper conditions as to continuity of work, being protected in his exclusive right to explore, he is actually an unlicensed, unauthorized and unprotected trespasser until he has discovered "veins or lodes of quartz or other rock in place bearing gold, silver, cinnabar, lead, tin, copper or other valuable deposits."[5]

Upon this point we have the language of Secretary Fisher, as follows:

> "It is becoming increasingly evident that the lode mining law needs changes in one respect, at least. The law at present does not provide for the creation of any rights in supposedly mineral land, except by the issuance of patents, and in that regard congress has provided that a patent can follow only on a legal location and has said 'but no location of a mining claim shall be made until the discovery of the vein or lode within the limits of the claim located.' As long as congress desires to adhere to the policy at present embodied in statute law of disposing of mineral land absolutely, the law quoted above tends fairly well to the development of mineral properties where the ore can be discovered at or near the surface of the ground, but it seems to be ill calculated for a district where, as is the case notably in some of the copper mining districts, the ore lies at depths of hundreds and sometimes thousands of feet. The expense of actual discovery of the vein or lode within the limits of any particular claim in such cases involves deep exploration, either by drilling or by the sinking of a shaft from the surface, or the extension of a tunnel into the claim. Either of these operations may involve great expense, and it has been repeatedly

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[5] Rev. Statutes, U. S. A., Sec. 2320.

urged on the department that investors are reluctant to spend the money required without further assurance than the law as it reads at present can give them. On this ground the department has been strenuously pressed to so construe the law as not to require an actual discovery of the lode which is supposed to exist within each claim, but to patent the claims upon evidence of the existence of mineral at or near the surface wholly disconnected with the supposed lodes below and of no value in itself, either present or prospective, it having been further urged that in these cases it was a matter of geological inference that ore bodies did exist far below the surface.

"It is obviously the duty of the department to carry into effect the intention of congress expressed in statutory form. Congress having said that no lode claim should be patented without discovery of the vein or lode, within the limits of the claim, it would be an evident usurpation of power for this department to patent lode mining claims without proof of actual discovery. The frequently repeated assertions that the recent rulings of the department have overturned interpretations placed upon the law for 30 years seem utterly without foundation, as is pointed out in the recent departmental decisions. On the contrary, had the department decided that it could dispense with actual discovery it would have overturned the practically unanimous holdings both of the courts and of the department ever since the enactment of the lode-mining law. Doubtless in some cases claims have been patented where there was little or no proof of actual discovery, but the patenting of such claims is evidently to be laid to a misapprehension of the facts by employes of the land office, and not to a misconstruction of law by the department.

"It seems, however, possible by a change in the law to keep in force the policy of the government expressed in the mining law of rewarding the actual discoverer of valuable veins, while at the same time giving such protection during the work preliminary to actual discovery as would make it possible for capital to invest, taking no more risk than that inherent in the question whether there is or is not in fact valuable mineral in the place where it is sought. I suggest that the law should be amended so as to give a prospector, for a term of years, an exclusive right of possession and of prospecting within a limited area of land. In case actual discovery were made within the time given, patent would issue. The prospector should be obliged to perform a reasonable amount of work during the existence of the permit in order to make evident his good faith in attempting to find mineral within the limits of the claim. He should, however, be given the right by proper proceedings, to settle disputed questions of intervening claims, both in case of conflict with other mineral claims and also cases of conflict with agricultural claimants, so that he might at the earliest possible moment know whether or not his title would be absolutely clear upon his making discovery."

Location of Lodes within Placers.—Placer mines are likewise located by discovery and held by annual work and acquired by purchase in fee simple forever. Known veins within placer locations must be declared and paid for separately; otherwise they are excepted from the placer patent and can be located by others in "lode claims." All veins on placer ground not known to exist at the time of application for patent belong to the grantee, but without extralateral or apex rights. If an applicant for a placer patent can be shown to have had knowledge of a valuable lode within his lines prior to the making of his patent application, his title as to that vein may be cancelled for fraud at any time upon application of a contesting locator. There is no limit to the time for such contests, and they are still being brought in some cases 20 years after the placer patent was granted.

The law is very defective on this point; for it frequently happens that veins discovered to-day have a value by reason of improved transportation facilities or metallurgical processes, although these same veins were of no value whatever when the placer claim was located and patented. The owner of such a claim is sometimes put to the expense and annoyance of defending such contests repeatedly, since there is no limit to the number of contestants. The law should be amended so as to make it impossible to attack a placer patent on such charges after a reasonable term of years.

Multiplicity of Claims Locatable.—Another defect in our present law is that permitting a prospector to locate an indefinite number of mining claims and to hold them without actually doing his assessment work. Many promising districts are kept from becoming hives of industry and producers of mineral wealth by the tying up of their territory in this way. The prospector should be restricted in the number of his locations, and real development work should be exacted.

Faulty Provision for Recording Claims.—Still another weak point in our present system is in the provision for recording notices of location. It frequently happens that mining claims are located within the boundaries of some railroad or other land grant. The locator files his notice in the office of the local recorder, and the railway company files its selections with the Commissioner of the Land Department at Washington. Both selections are approved or at least allowed to stand, perhaps for years, each claimant believing his equitable title unclouded until an application is made for patent. Then a contest ensues, bitter feelings are engendered, and much money is needlessly spent because of the imperfect statutory provision for filing notices of location.

Lack of Provisions for Appeal.—Still another serious defect in the United States and Alaskan mining and land laws is the lack of any provision for appeals to the courts from the decisions of administrative officers. It is contrary to the general spirit of our institutions and an anomaly in constitutional government to take away from any citizen property rights to which he considers himself justly entitled under the law, by the mere fiat of an appointed government official who is here to-day and gone tomorrow. To place in the hands of such officers the final dicta in matters involving property valued at hundreds of thousands of dollars, and to provide no method of appeal to any duly constituted nonpolitical judicial tribunal, is not only to subject the said officials to great and unnecessary tests of moral courage and fidelity, but to require in them the qualifications of superior judges and an experience in the interpretation of the law which many of them cannot be expected to possess. Serious injustice may be done without any remedy at law to the defeated applicant. In the interests of justice, provision should be made for appeals in important cases, and perhaps in all cases, from decisions of the commissioners of the General Land Office, or of the Secretary of the Interior, to some court of competent standing and jurisdiction, whose decisions could and would be accepted by the public and the interested parties as justified by the law and the evidence.

Extralateral Rights.—The crowning absurdity of our present mining law is what is known as the apex provision, which permits the owner of the outcrop of a vein to follow it on its downward course into the earth and beneath the surface of property owned by another. This is the law that has made us famous among miners the world over. Not that we originated the practice, for it was tried by the medieval Germans and abandoned, as is said by an authority on Prussian mining law because "interminable law suits were inherent in the system," and it was in force in British Columbia for a brief period and likewise abolished; but we have held it now for half a century or more, and although our reputation for progress and right thinking is fairly high, we are still burdened with this pernicious principle. Opinions without number could be quoted against it and but seldom one in its favor.

Hoover says:[6] "Lest the Americans think that the Apex Law was a sin original to themselves, we may mention that it was made use of in Europe a few centuries before Agricola."

Geo. Otis Smith, Director of the U. S. Geological Survey, says:[7] "The law of the apex has proved more productive of expensive litigation than of economical mining."

A. Montgomery, State Mining Engineer of Western Australia, who is certainly well qualified to express an opinion, says, in a letter to your committee: "The extralateral right principle obtaining in portions of the United States is a standing marvel to the rest of the world, and that it could be seriously proposed to perpetuate it outside of cases in which it has already been unfortunately granted, seems incredible to most outside engineers with whom I have come in contact."

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[6] Hoover's "Agricola," p. 83, footnote.

[7] Annual report for year ending June 30, 1911.

Many others have expressed themselves to us in a similar vein, and a synopsis of their views accompanies this report. From the replies thus received in answer to letters sent out by the committee we are convinced that the sentiment of mining men is overwhelmingly opposed to it in principle, and that the majority, although not so large, is in favor of its repeal at as early a date as possible.

Miscellaneous Defects.—There are many other shortcomings in our present law. There are no adequate and proper provisions for the location and operation of oil wells, phosphate deposits, rare earths, haloids and many other mineral substances. Our coal land laws are imperfect; the petroleum and natural gas resources should be safeguarded; assurance should be given as to the titles already granted, and the prospector should be again encouraged to go upon the public domain and discover additional treasures for the benefit of himself and the nation at large.

Recommendations.—This committee has not felt called upon to make any attempt to draft a new code of mining laws, nor does it feel competent to do so. Such a task might engage the attention of a commission of business men, mining engineers and attorneys, all selected because of their peculiar qualifications and experience in such matters. Indeed there is ample material to occupy the time of such a commission for at least one year in working out a harmonious scheme by which all interests should be properly subserved and the best results obtained. We have gathered together a library on the subject of mining laws and have investigated the statutes of many countries, and it has seemed best at this time simply to call for an expression of opinion from members of the Society on certain elementary principles. In this way it will be possible for us to arrive at a correct conception as to the framework on which may later be built a complete structure. We therefore beg to submit for the consideration of the Society the following recommendations, in the form of a series of resolutions:

1. The mining law should be revised, not piecemeal, but thoroughly, so as to co-ordinate and harmonize its various provisions.
2. Mining claims should be locatable regardless of a "discovery" and held only so long as the specified development work is performed.
3. Placer locations should be limited to deposits of loose material above solid bed rock. The locator should have

a preference right to locate also any lodes developed on his placer ground.

4. A statute of limitations should establish a reasonable term of years beyond which placer patents shall be immune from attack on the ground of fraud.
5. Provision should be made for the location and working of petroleum, phosphates, rare earths, haloids and other mineral substances not specifically mentioned in the present law.
6. Full privilege of appeal to some competent court of law should be provided for in all cases of contests between rival claimants, or between a locator and the government.
7. Notices of mining locations should be so recorded as to give the fullest possible notice to the world and to all concerned.
8. The apex law should be abolished.
9. Existing titles should be reaffirmed and fully recognized and no effort should be made to create retroactive legislation.
10. For the purpose of giving the fullest consideration to the needs of every branch of the mining industry and every section of the country, it is desirable that a Government commission be created by act of Congress, whose duty it shall be to investigate by every proper means the questions and interests here referred to, and to make recommendations as a basis for the proposed mining law revision.

Respectfully submitted,

HORACE V. WINCHELL, *Chairman.*
C. W. GOODALE,
M. L. REQUA,
Committee on Mining Law.

Minneapolis, Minn., Mar 15, 1913.

MEETINGS OF SECTIONS

NEW YORK

The April meeting of the New York section was held after an informal dinner at the Chemists' Club, on Thursday, April 17, at 8.30 p.m. The meeting was called to order by the chairman, Mr. Stone. The members present were: S. H. Ball, R. M. Catlin, E. L. Dufourcq, L. D. Huntoon, H. H. Knox, E. B.

Kirby, H. S. Munroe, T. T. Read, F. F. Sharpless, G. C. Stone, A. H. Wethey, with Messrs. Hatfield and Francis Winslow as guests.

The Chairman.—The minutes of the last meeting have been published and unless there are some corrections they will stand as printed.

Our subject for this evening is "The Relation of Mine Manager to Recent Graduates." I have a paper from Prof. Robert Peele, who unfortunately is unable to be present, which I will ask the Secretary to read.

Remarks on the Relation of Mine Manager to Recent Graduates.

By Robert Peele.

In considering the subject proposed for discussion this evening, one is struck by the extent of the field covered by the present-day student of engineering.

Fifty years ago, compressed air power transmission was just beginning to be understood; fifty years ago the science of mechanics was so undeveloped that the determination of stresses in framed structures was largely based on experiments conducted the conditions surrounding it than any one of the scientifically with the aid of models; forty years ago electric transmission of power was unknown, and electric lighting was in a rudimentary state. At the same date, practically all mine pumping was done by Cornish pumps. In the edition of Rankine's famous textbook of civil engineering, which I used as a student in 1883, there is no mention of steam shovels or any other mechanical excavator. The present-day chemical theories are hardly comprehended by those who received their training fifteen years ago, or less, and who have had no occasion to study the new bases of the science. The enormous development of gas and oil engines is of very recent birth. A few years ago thermo-dynamics was chiefly a theory; now it is a useful tool of the engineer in steam, compressed air, and gas engine practice. These are only a few indices of the advance in engineering science and practice within the last half century.

Formerly the work of the engineer was accomplished mainly by skill and ingenuity, attained by long periods of apprenticeship in practical construction; it was sometimes aided by a limited acquaintance with geometry, trigonometry and elementary mechanics.

Before the days of technical schools, there prevailed what was practically an apprentice system. A young man, desirous of becoming an engineer, began his training in an engineer's office. He received no salary at first; instead, he paid a fee. He copied papers, specifications, estimates, etc., made drawings or maps of tracings and served as assistant in different capacities, according to his fitness and abilities. In the course of time he learned the elements of his profession. Occasionally, when not especially busy, the master engineer imparted knowledge directly, as a teacher. This was not required, however, and usually not even expected. The progress made by the apprentice depended on his own industry and capability. Given an earnest, hard working boy, in the office of an able and conscientious engineer, with a large practice and we find the apprentice system at its best. It was the privilege of the apprentice to observe and study the current of professional business passing through the office; to get all he could out of it.

It is clear that this mode of learning the practice of engineering was inefficient and wasteful of time. It was indirect, haphazard and largely dependent on the personal equations of master and pupil.

The place of the apprentice system has now been taken by the engineering schools. These schools have attained a degree of efficiency not dreamed of two generations ago. At graduation the student of ordinary ability and industry has a grounding in mathematics, the natural sciences, and the different theoretical studies constituting the foundation of modern engineering, which the apprentice of the same length of service under the old regime could not possibly possess. What the young graduate of the present time lacks is experience and practice in applying his theoretical knowledge. In this, the technical school gives him a start through the medium of laboratory work, drafting and field surveying, together with some weeks of vacation work, in shops or mines or metallurgical establishments.

In the well-organized engineering school the four undergraduate years are a strenuous period. All of the available time is crowded with the numerous courses of study which now make up the training of the engineering student.

Confining the discussion more particularly to our own professions, modern requirements demand that the student of mining or metallurgy shall have acquaintance not only with the specifically mining and metallurgical subjects, but that in addition to his training in the fundamental studies, common to all fields of engineering, he shall be given some knowledge of chemistry, and certain branches of civil, mechanical and electrical engineering. The young graduate then goes into the field to get his practical experience. It cannot be questioned that this practical experience is obtained in a measure at the expense of his first employers.

Mine managers have not infrequently expressed the opinion that this condition of things is wrong and unfair to the employer of the young engineer; and that the mining school should do something to bridge over the gap existing between the end of the school training and a condition of reasonable efficiency and usefulness in practical work. The implication in the manager's criticism is that the short-coming might be remedied if the teachers of engineering would only take the necessary steps. Perhaps it is too much to expect the average mine manager, or other employer of embryo engineers, to have in consideration the conditions which formerly prevailed and to which I have already alluded. If the ground to be covered in the school were less extensive, undoubtedly more time could be devoted to the practical side of the student's work.

The employer's criticism cannot be answered in a word; possibly it is hopeless to expect a wholly satisfactory solution. My own opinion may be expressed as follows:

1. That the wiser course is to train the student, as thoroughly as time will permit, in fundamental subjects upon which all engineering practice rests; special attention being given to those subjects, like mathematics and the natural sciences, which are taught and learned with relative facility in the school, where the student has the advantage of instruction by specialists, and the use of expensive laboratory and other equipment. If these subjects are not learned, or at least well begun, in the school, they will rarely be mastered in later life.

If the justice of this view be granted, and realizing that more "practice" in the student years can be given only by reducing the time devoted to fundamentals, it would appear that the criticism of the employer of the young engineer is not well founded.

2. Another important consideration is this: Would it be possible in the school to give the student a sufficient variety of "practical" work, to enable him at once after graduation to meet the manager's demands in whatever line of duty the young engineer might be called on to serve?

This would require special preparation. The young graduate might conceivably specialize in one or two directions, but could not prepare himself to fill immediately after graduation a position of responsibility. It is only reasonable that he should begin in a subordinate capacity. His *adaptability* is much more a matter of personality than of training; but, by reason of his school training, he can easily and quickly be broken in to practical work of whatever kind; and, after all, what an employer chiefly wants in the young engineer is good, common sense.

It hardly seems to be open to question that the mining school training should be an all-round training, not that of a specialist.

3. It has been held by some that, after completing the course of study in the mining school, the young engineer should have additional training and experience in the *detail* of mining and metallurgy, and of management, both on the technical and business side. But where can such training be so efficiently secured as in a mine or metallurgical works, under a competent superintendent or engineer? The young graduate will there get the real thing and be spurred on by the consciousness of personal responsibility for his own failure or success.

It is true that apprentice schools are satisfactorily maintained by some of the large engineering and manufacturing concerns; but these schools are the works themselves, not establishments conducted for educational purposes.

Suggestions have been made that if means were provided a more or less extended period of field study might be established at some mine, operated by the teaching staff of the school with the aid of students. Aside from the cost, the greatest objections to this proposal are that the work done would lack both variety and reality. It seems to me impossible that the independent mine or metallurgical works, operated for educational purposes, can ever be an economic success; and failing in this it would not serve the purpose desired.

In conclusion, I do not think the view that young graduates of mining schools are inefficient and unpractical, is held by any considerable number of employers. Facts prove the contrary. Suitable positions are quickly obtained in nearly all cases. The so-called practical man is no longer sought after. Most employers realize that, provided a young man is of reasonably good mental and physical quality, his technical training has not only afforded him the requisite knowledge to start him well in his profession, but that it has developed his powers to a high degree of receptivity, making him capable of promptly rising to the occasion and of meeting the demands upon him.

The following letters were then read by the Secretary:

R. V. Norris.—"I regret exceedingly that I shall be unable to attend the next meeting of the New York section, and discuss the interesting question you have suggested. About all I could say would be that very few recent graduates are apparently attracted by the anthracite region. I have offered positions to a very large number, with but few acceptances, the reason apparently being that the pay in starting is not equal to that which could be obtained in metal mining."

Sidney J. Jennings.—"I think it would be very desirable if the Society could arrange to give recent graduates, of marked ability, an opportunity to take what would amount to a post-graduate course in the mines and metallurgical establishments with which members of the Society are connected. During this period of, say, one year, they would thus get a more complete view of what the profession is doing before they settle down to learn any particular division of the industry very thoroughly. I would like to see an attempt made by the Society to select such students and give them proper training to become leaders in industrial work in America."

The Chairman.—Prof. Peele has given us the college view. Mr. Catlin, can you tell us something from the other end?

R. M. Catlin.—With regard to the technical training of young men, I have been very much astonished, as perhaps some of the rest have been, with the position taken by Crane, the manufacturer of valves of Chicago. I cannot understand his point of view. I do not know how it could be other than useful for a young man to learn to use tools. The chief value of a technical education is that the young man is taught how to think, but they should know how to use the instruments that are put into their hands. Unfortunately most young men undergo a period of incubation before they blossom out. It is only too natural, when they leave college, to think there is not much left to learn. They now have to adapt themselves to varying surroundings, and after learning how to think right and how to use tools, a great deal depends on the capacity of a young man to adapt himself to conditions.

I have had some experience with young men. I had been away a great many years and when I returned I had no acquaintances here who were available, and realizing that it was largely a new field to me, in which I had to devise ways, the best thing seemed to me to procure young men. I did not want the practical man. I did not want the man who had won his education in some other way. It is often harder to unlearn than to learn. Perhaps I was fortunate in getting young men. Many men have passed through my hands. The only way one can learn to appreciate the value of a technical education is to have some bright young man come along. After all, let him feel that he does know something and that all he has acquired is not entirely theoretical. Do not tell him how to do his work, particularly if his heart is set on it. Let him learn for himself. One failure is sometimes worth two successes, if it merely teaches him the way not to do a thing. Repression is not a good thing. Encourage a young man when you can, and I think you get all that is coming to you. I cannot agree with those who think that a technical training spoils a young man. On its face, it seems absurd. If it does nothing else, it teaches him to think right, to think clearly.

L. D. Huntoon.—If we had more operators like Mr. Catlin, who would take a personal interest in the young graduates and place them on their own responsibility, thereby developing originality, we should have no trouble in establishing an apprenticeship system.

I agree with Prof. Peele in his opinion that the school is a place for thorough training in the fundamental subjects upon which the engineering profession rests and that time should not be sacrificed in trying to graduate practical men. The conditions under which the student works are entirely foreign to the conditions he will find in practice. As an undergraduate the student shoulders no responsibility and relies entirely upon his instructors to make all decisions. The efficiency standard for a large percentage of undergraduates is the passing average. This requirement of course is entirely different from practice. Personally I think it is impossible for colleges to graduate practical men and furthermore that it is not advisable to try and do so if the fundamental principles must be sacrificed. If we assume, as I think we must, that the college is not the place to try to make practical men, the question then arises, how are the young mining graduates to be made practical? This subject was discussed at length in Bulletin No. 24, June, 1910.

In answer to the above question I offer the following:

The undergraduate students would have a thorough training in the fundamental principles, as outlined by Prof. Peele. During the summer, between the second and third years, I consider it very important that the students should visit a mine with an instructor for the prime object of being taught to observe details and take notes which will be of value in later life. This course need occupy only about four weeks. During the summer between the third and fourth years the students should be sent in squads of two to different mines without an instructor, to make a detailed study of the entire operations and take notes for their thesis. On the completion of the undergraduate course and the writing of a thesis, the degree of "Bachelor of Mines" should be granted, and not the degree of "Mining Engineer." To obtain the degree of "Mining Engineer" a further period of two years' practical work in mining operations, as an apprentice covering such work as will be acceptable to the Faculty of the college from which the Bachelor's degree was obtained, would be required.

The character of the apprenticeship work should be determined by a committee consisting of mine operators and instructors. The following outline is merely a suggestion for such a committee:

That an agreement or contract be drafted covering a period of two years.

That the monthly salary of $\$x$ be paid during the first six months and increased $\$y$ semi-annually. The monthly salary during the last six months will then be $\$x + \$(3 \text{ times } y)$.

That 25% of the salary shall be withheld until the contract is completed. The company to have the right to discharge such apprentice by the payment of the 25% of the salary withheld up to that time, and the apprentice to have the right to cancel the contract by forfeiting the 25% withheld. Under such an agreement either party can honorably cancel the contract. Assuming that x is $60 and y is $10, the apprentice will receive a total salary for two years of $1,350 and a bonus at the end of two years of $450, making a total of $1,800 for two years' work. This bonus should be an incentive to thrift.

It is very difficult to state the character of the work to be assigned to the apprentices as conditions vary. A general clause might be embodied stating that the apprentice is looked upon as a learner, or post-graduate student, and that so far as convenient his work will be varied during the life of the contract.

If the engineer in charge of the operations could arrange to have a meeting once a week with his apprentices for the purpose of questioning and advising, it would serve the double advantage of assisting the apprentice, and possibly of bringing to the attention of the operator details of the work which he has overlooked; suggestions from a bright young fellow might often be of great value. I consider it advisable that these apprentices be required to take notes and that the notes be examined and corrected by the engineer in charge of the work. Also, that the taking of these notes be required by the college, which will later determine whether the apprentice is eligible for a mining engineer's degree.

R. M. Catlin.—In what portion of a mine would you start him?

L. D. Huntoon.—That would have to be decided by the committee. That is still open to discussion. Perhaps surveying, or time keeping, or timbering.

R. M. Catlin.—The greatest difficulty (at least to my mind) none of us has mentioned. A necessary number ot shift bosses are found in every mine, and there are very few mines in which those shift bosses are technical men. Thereby hangs the difficulty. The shift boss realizes that he can only go so far and that the young fellows will outstrip him in the end. The great difficulty is to discover where to side-track them without collision.

H. S. Munroe.—The subject of apprentice training has the late Alexander L. Holley to thank for its first impetus, through his suggestive paper on "The Inadequate Union of Engineering Science and Art", read at Washington before the American Institute of Mining Engineers, 36 years ago.

Perhaps an outline of the experiments which I personally have made from time to time may throw some light on the difficulties of the problem. These experiments began when I was made a professor in the School of Mines. I started in with the idea of availing myself of Holley's suggestions and formulated a plan for an organized summer school for the study of mining methods and mine plant. The first session of this school was held at Drifton, Pa., at the mines of Coxe Bros. & Co., in the summer of 1877, with a class of 13 men. These organized summer schools were continued until 1905. By that time the classes had become inconveniently large. It was difficult to find in any one mine the number of safe working places required, with miners sufficiently intelligent to permit the boys to learn much from them. This, in some years, made it necessary to divide the class between two or three mines, some miles apart, which, of course, complicated the work of supervision.

In 1905 the plan was adopted of sending the majority of the class in small sections, with printed instructions only, to the separate mines, at which arrangements for their work had been previously made. For several years the organized school under one or more instructors was retained for a small part of the class. Since 1909, all students do the required work under the new plan, and on the whole we have been able to get quite as good work out of the men as formerly. The students now have the great advantage of being thrown on their own responsibility; they come in intimate contact with the management of the workmen, and often, on their own initiative, do more than is required. They come back with a keen appreciation of the work they have seen done, and are well prepared for the instruction we give them during their Senior year.

In the schools we have thus been laboring to fit students for apprentice work, and it now seems that the managers should take advantage of this preliminary training and continue it with the young graduates. They must, of course, be treated as employees, and must be required to earn their wages by useful work. The problem is now up to the managers, to make the greatest use of these young graduates. We should give them as much responsibility and as much authority as they are fitted to take, and increase the responsibility and authority just as rapidly as they can accept it, but at the same time hold them up to their work and do not favor them. I believe, however, that a scheme can be organized, if we put our heads together, by which the graduates can be of service to the management and more than earn their small salaries. It ought to be possible during the period of apprenticeship to cover a considerable variety of mine work. The apprentice should learn something of the business side of mining, time keeping, supply clerk's work, and cost sheets. For this purpose they should spend a certain part of their time in the office.

The next, and the most important thing, is to give them the touch they need with the executive and administrative side. It seems to me, from that standpoint, we might take a leaf from the experience gained in the summer-school work, and employ the young men as efficiency engineers of a sort; let them observe and report the conditions underground, particularly such as affect the cost of mining. For example, suppose they are observing the progress of a drift; let them spend a day or two or a week with the contractors who are running the drift, and bring back a complete record of the work done with suggestions as to methods to expedite the work and to reduce costs. If the suggestions made appeal to the management, the young man might be given the responsibility of directing that work for a time following the plan suggested, and see if he can make good.

It seems to me, in that way, young fellows can be made exceedingly useful to the management while also obtaining an intimate knowledge of underground conditions, a knowledge otherwise not easily obtained.

H. H. Knox.—The Institution of Mining and Metallurgy of England has been trying to solve this problem by making arrangements with big operators in South Africa and Australia to take a certain number of graduates from the Royal School of Mines and put them through the various operations after graduation—the mines, the mills and the smelters. A certain number are taken each year and they proceed with their post-graduate work. What the result is I do not know. Personally I am of the opinion that it is not of advantage. For four years a man has been led, and has been taught, that success depends on carrying out instructions. At the age of 21 or 22 he should learn to be responsible and independent. He will not learn this by his post-graduate work. My experience is that if a young man is ultimately to succeed, he will get his experience without any particular efforts to give it to him. No man is going to hold down a job when he knows there is nothing there to learn.

E. B. Kirby.—I have been very much interested in the discussion, and I wish to endorse most heartily the views expressed, particularly those of Mr. Catlin, because I have had a great deal of experience with young students and young graduates. I have always gone out of my way to assist them and give them a start. I have always built up my staffs very largely from such men, and I have taken particular pains to help out summer school visitors. I have always had large parties in every mine I have had anything to do with. In watching their work I always have a chance to discuss some of their problems with professors and their assistants, and of course I know my own troubles. As a result of that I do not see any hope for such an apprenticeship system as has been suggested. I do not see any opportunity for vast improvement in the details of the present system, and believe that the present system, as a whole, is about the best that can be expected. As more graduates enter the field of mining more friends will be ready to aid those who are educating young students.

Now a few words about the education. Almost all of us who have hammered through the hard side of mining life indulge in more or less criticism as to the methods of teaching young engineers. Engineers will differ somewhat, but if you analyze their feelings I think you will find that the prevailing opinion among men actually engaged in practical work is that much that is not necessary is crowded into the college courses, and that some important things have been neglected. This is largely due to the system. I have long been convinced that the over-loading of students with a mass of detail is a mistake. I know in my own student days we were simply worked to death. If I remember rightly, about one-quarter of the class survived, about twenty-five out of one hundred. A good deal of time could have been spent in developing features which would have been more useful, as, for instance, the personal or social habits, the ability to talk decently and to take part in social affairs.

R. M. Catlin.—I quite agree about this superfluous knowledge. The difficulty is that we do not specialize in this country. If a man knew he were going to follow metallurgy or electricity, he would specialize in them. The difficulty in America is that we centralize, instead of specializing, as in Germany. There, one is an expert in one direction and has no knowledge in another direction.

T. T. Read.—At the Great Falls plant of the Anaconda they maintain a research staff. Instead of cutting down the number of men known as engineers to a minimum, they have as many as they can persuade the board of directors to authorize. They have a staff of from sixteen to thirty men technically trained in mining. These men they put to work to study the operations, and they have secured admirable results. At one time they were unloading cars on three shifts. Now, as a result of study by these men, they not only do their hoisting in only two shifts, but they maintain a decreased force. They have cut down expenses one-half. These young men similarly studied the flow sheet and worked over it until they devised an improved plan, which they are now installing. These young men are also largely responsible for the present Great Falls type of converter. These men are producing actual results. They are not being carried on the payrolls for more than they are worth, and they are giving value in return.

R. M. Catlin.—How long do they stay in those positions?

T. T. Read.—Either until some one takes them away or until they otherwise drift away. Great Falls is a training place. Men from there are going all over, and their places are filled with recent graduates.

H. S. Munroe.—I feel that it would be desirable to appoint a Committee on Apprentice Work, and I think that the President, in appointing a committee, should have it consist of mine operators and professors, to study the subject, to get information from Great Falls and South Africa, or from other places and other people who have experimented in this direction, and make a report; they might perhaps organize some system by which this Society could be of use to young graduates, not only from the standpoint of the manager but also from the standpoint of the graduates. I make a motion that the New York section ask the President of the Society to appoint such a committee.

The motion was seconded by Mr. Huntoon, and carried.

On motion, the meeting adjourned at 10.40 p.m.

L. D. Huntoon,
Secretary of Section.

SAN FRANCISCO.

(The following address by Mr. A. J. Pillsbury, chairman of the Industrial Accident Board of the State of California, was delivered at the meeting of the San Francisco section on Feb. 3, 1913, minutes of which appeared in Bulletin No. 57. The manuscript did not reach the Secretary in time to be included in that bulletin; hence, it is printed here as a part of the minutes of that meeting.—*Secretary.*)

Employers' Liability and Workmen's Compensation.

By A. J. Pillsbury.

I believe I am familiar with employers' liability, but must confess that I know less of mining than of anything else in the world. I take it that you do not need to hear anything about workmen's compensation *per se*, but that you would like to know what we are proposing to ask the legislature to do; hence the remarks that I will make this evening will relate to our legislative program. When I have finished I shall be very glad to have you ask any question that you would like answered; I hope to be able to give a reason for the faith that is in me, and I believe I can do it.

Tonight I am assuming that you all know of the subject of workmen's compensation; you know something of what the civilized world has done about it; that the old form of liability in damages based upon negligence no longer exists in Europe, west of the Balkans and outside of Portugal; that the old form of liability insurance has been swept from the continent, and that our country is rapidly moving towards the adoption of workmen's compensation laws. Fifteen states already have such ways; 10 more will probably have them before their legislative sessions end this winter; 22 states have repealed the old common-law defenses, or modified them very greatly, and everywhere north of Mason and Dixon's line the last vestige of those survivals from another period will be swept away in a little while.

Now I want to break it to you gently, and with becoming modesty I trust, but if the legislature will adopt the program practically as submitted by the Industrial Accident Board, California will have the best code of workmen's compensation insurance and safety laws in the world. And why not, for we have the world to select from and comparatively a clean slate to begin with, and we have had a full year in which to do the selecting. We should be recreant to the trust imposed upon us if we did not offer the legislature the best plan, or as good as the best in our time, and we believe we have done so.

First, we have revised the Roseberry workmen's compensation liability law. That law was a good beginning, but only a beginning. Its original was a law drafted by a committee of five men in Wisconsin, who gave some two years of study to the subject, as they had opportunity; but at the time when they made their studies all the information on European experience which now exists was not accessible to them. Within the last two or three years many men have gone to Europe and have made careful studies of the whole system. The world's attention has been riveted very largely to the subject of social insurance, and we now have sources of information that were not accessible to the Wisconsin committee.

Mr. Roseberry adopted the Wisconsin law, transforming it somewhat in order to make it fit California conditions; it was the best enactment possible at that time, and our legislature adopted it. We made a good start, but there were stitches dropped all along the line; certain things were not foreseen which 16 months' experience in administering the law has brought out. We have since tried to pick up the dropped stitches, to supply many deficiencies, but our main accomplishment has been to advocate the removal of the $100 limit on medical and surgical treatment. The legislature feared that if physicians were given an opportunity they would run up very high bills; the resulting tendency has been to limit the value of medical and surgical relief to $100. That has sometimes meant that an arm which might have been saved has been amputated, that there has been dismemberment where there need not have been. We conceive that the first duty of a compensation law is to restore an injured man as nearly as possible to the condition he was in before he was hurt. To do that requires the best medical and surgical art of our time, and what is expended in medical and surgical relief will generally be saved in compensation benefits. But, as you know, medical gentlemen have a way of charging the poor man a very moderate amount, the middle-class citizen a fair fee, and the rich man a good stiff fee; there has also been a tendency at times to regard the state, or a state institution, as a rich man. Hence, before we undertook this change, we made tentative arrangements with the faculty of the Medical College of the University of California, and with the State Board of Health, by which severe cases from north of Tehachapi will be transported to San Francisco and from the south, to Los Angeles. There the cases will be cared for in hospitals connected with the medical colleges. They are about to build in San Francisco a large new hospital, in which accommodations for a certain number of these cases will be made, and we shall then procure their treatment by the best that our medical and surgical science of the day affords, and at reasonable cost. We are perhaps taking a little risk in advising the legislature to abolish the $100 limit, and to alter it to a time limit of six months. We have, however, learned enough about the world's experience in this matter to feel sure that the ultimate cost will be scarcely any greater than under the provision of the $100 limit; then when it is necessary to resort to bone or skin grafting, operations which take time and cost money, the injured man can have them.

Secondly, we are proposing a new schedule of benefits in place of the one in the Roseberry law. Under the present law, a man who loses three fingers from the left hand gets as much compensation as a man who loses both arms, or both eyes, or both legs, or his life. Whoever suffers an injury amounting to 30% or more of total disability gets a full three years' average annual earnings, although extended over a longer time. A man who has suffered an irreparable injury, who has lost all of his earning power, is thus carried for about four years and a half and then dropped with a dull thud on to public or private charity.

Our new schedule better fits the needs of the injured man. I call it a new schedule because it is perhaps the only thing that we are proposing in the way of legislation that is new; all the rest has been tried out somewhere in the world and demonstrated to be as successful as anything can be that is human. We hold that a man who has lost all of his earning power is practically dead, so far as his family is concerned. Therefore we propose to pay to his family the full three years' average annual earnings that they would receive if he had died. But he is not dead; he has to be taken care of while he lives; hence we add 40% of his earning power for life—a life pension. If, however, he has lost only 90% of his efficiency he has 10% left; in that case we allow him 30% of his wages, which, with his remaining earning power, gives him 40%. If he has lost 70% of his earning power we give him only 10% of his wages, which, with the 30% of earning power he has left, gives him 40%. Coming down now to 60% disablement, when a man is hurt, one of two things is possible: he may either rehabilitate himself notwithstanding his maimed condition, or he may not be able to; but the world's experience seems to show that what we would call a 60% disablement of the human machine may be overcome, age and occupation being considered, in 4½ years—240 weeks. We make that our dividing line. Above that limit everybody gets a pension for life; below it each one gets a compensation of 65% of his wages for such a portion of 240 weeks as the final degree of his injury bears to total disablement. That is, for a 60% disability, we would give him during 240 weeks what he would earn in three years; for a 50% disablement we would give him 65% of his wages for 200 weeks; for a 40% disablement, 65% of his wages for 160 weeks, and so on down to 20 weeks' wages for a 5% permanent disability.

The preceding all relates to permanent disabilities. We do not propose particularly to change the schedule for temporary disabilities, although we do this: we extend what we call the waiting period to two weeks; that is, we cut off below this 60% line enough of the expenditures that are not necessary, on an average, to rehabilitate an injured man, to permit those above that line to be carried through to the end of their days. Hence, this further saving on the second week of disability, that is, depriving those who get well, and are able to go back to work in two weeks, of any compensation, the new schedule will cost slightly less, all told, than the old. Of the 10,000 accidents which we have tabulated, the conclusions from which tally very closely with the combined experience of Germany, France, Austria and Italy, we find that 90% of all those who are injured entirely recover of their wounds; their injuries are temporary, and they get well, on an average, in 28 days. Of the other tenth, 5.8% are permanently injured and 4.2% are killed. The sum of these two corresponds closely with European experience, but taken separately they correspond not at all. We kill four times as many workmen as they do in continental Europe, mainly because our machines are not protected. In Europe they maim nine but kill only one out of 100 who are injured.

We are extending somewhat the jurisdiction of the board. We ask that our board be given exclusive jurisdiction over the whole problem of industrial accidents from beginning to end. Being required to go to court, and to manipulate the machinery of the law, amounts to a denial of justice to an injured man who has few friends and little money and is flat on his back. Besides that, the machinery of the court does not well lend itself to solving the problems which we have to solve. For instance, James McGavin, an electrician, is found dead at the foot of his switchboard. Practically all the evidence introduced at the hearing went to show that 220 volts, all there was, could not kill. If we had been a court, or a jury, we would have been required to find that that man was not electrocuted. To be sure, the coroner's inquest and the autopsy showed that he probably was killed by electricity. Beginning then to investigate, I first asked Professor Corey, how many volts will kill? He said 400. "But," I replied, "here is a man dead and only 220 volts." He said, "You will find that there were 2000." We were not, however, able to discover that. We then took it up with different electricians, all of whom said that 220 volts will not kill.

Professor Christy.—I have known a case where 110 volts were fatal. It is the number of amperes passing through vital organs that determines this. The amperes depend not only on the voltage but on the conductivity of the skin. This varies enormously. When the skin is dry the resistance is great, but when it is moist with conducting salts, and the area of contact is great enough, 110 volts may be fatal.

Mr. Pillsbury.—I found that in Switzerland 36% of all deaths by electrocution occurred where the voltage was less than 250. I found that at Nantes, France, at the abattoirs where they kill the animals which people consume for food, that 220 and less voltage was used. I learned that a young man in a salt basement, where there was much brine, touched a fan and was killed with less than 110 volts. At Sacramento, while this investigation was going on, we found that a man 26 years of age, an electrician, in the prime of life, leaned over to look down between floor timbers in an attic in the Southern Pacific depot, came in touch with a wire, and was killed with 110 volts. I mention these cases merely as illustrations to show how we must search to find what the world knows about many of these problems, a thing which a court cannot do, in order to do justice.

Finally, gentlemen, in the revised law we seek to make its provisions compulsory on every employer of labor in the state, no matter what his occupation, except the employer of a casual workman who is not working in the line of his business or profession.

Now when the legislature puts this burden upon the employer, he is right in expecting the legislature to go further, and permit him to insure that hazard. The word compensation is not exactly expressive; we got it from Germany, where it means compensation, but it does not compensate. The benefits which our law provides do not come anywhere near compensating a man for injuries sustained. It is a limited insurance. It makes an employer a limited insurer of his men, to tide them over the period of adversity until they can get on their feet again.

There are about three ways of treating the insurance problem. One is to let it alone and let it work itself out. That took life insurance the better part of a century; fire insurance has not quite worked itself out yet, and compensation insurance or liability insurance has hardly made a good beginning. Of 14 countries in Europe, 10 have found it necessary to adopt some form of state insurance in order to provide justice for employers and employees under insurance. Only two states in the world have compulsory insurance—Washington and Norway. That of Washington covers 47 industries, but only two-fifths of those who work; that of Norway covers only the manufacturing industries. Germany provides insurance, but it is all operated through mutual organizations, which are democratically managed. We have adopted the competitive state idea. France, for instance, has such an institution, which stands ready to take insurance at certain rates, which are deemed to be fair and just; and it has to do only 1% of the country's business to solve the problem. Italy, on the other hand, has a competitive state carrier, which does about one-third of the total business. Between those two extremes there are all degrees of competition by the state with private insurance enterprises, but the state concern fixes the rate beyond which a private institution cannot charge. New Zealand, for instance, has had such a system for 10 or 11 years; it does about one-tenth of the total business, and is self-sustaining; it is in competition with 25 other carriers, and they are all getting along comfortably.

We are asking the legislature to permit us, as a board of directors, to organize a state compensation insurance fund, to open offices in all of the principal centers, and to make insurance as accessible, if possible, as postage stamps—for we have asked the Postmaster-General to permit the postmasters of the second, third and fourth class offices to act as agents of the state in making this form of insurance available. We are asking for $100,000 as a cash surplus to begin with, in the event that some calamity should come upon us which would make a demand in excess of the premiums as they come in. It is the intent that this institution shall be neither more nor less than self-sustaining, after a while; but it takes a little time for any new enterprise to get on its feet. Any insurance company opening offices for the first time in San Francisco will have to pay out, say, $50,000 or $60,000 in cash before it can begin to take in much of anything. We ask $136,840 to carry the central office expenses and the field men for two years. We believe that in two years, or four at the most, the state institution will become entirely self-sustaining; and to become self-sustaining we figure it will have to do only about 11 or 12% of the insuring in the state. Thereafter it will cost the state nothing; and we shall furnish the insurance at what it costs, except that a small percentage will be added to create a surplus to cover the calamity hazard in case there should be an earthquake, or such a catastrophe as the burning of the Triangle shirt-waist factory in New York. A million or two million dollars should be loaned out over the state as a surplus against that hazard. Otherwise insurance will be sold exactly at cost, and the opportunity of a private enterprise to make a profit in competition with this state concern lies in its ability to do business more efficiently than the state. It is generally supposed that a corporation can do business cheaper than the state because it does not employ politicians. If it can, that is a perfectly legitimate profit. We believe that competition between the state and these private carriers will be good for the state institution, better for it, indeed, than to enjoy a monopoly of the business, in which case the state officers might not devote themselves sufficiently to their duties.

We propose, as a minimum, to sell a policy covering the service of one man one day, and from that up to any number of men any number of days. We propose to meet every insurance need that the state feels. We will insure the working employers and the members of their families who work with their employees. In Bavaria, 75% of all the claims that are paid by the great agricultural associations, which there do the insuring, are paid to farm owners and members of their families. They are all insured. We will insure the man who employs no one but himself. A blacksmith is just as liable to be kicked by a mule as any hand he might employ, and will need the compensation just as badly. He may insure himself as the employer of himself at the same price as he would insure a hired hand. Even the casual employee will have a chance. We shall not require you to insure your casual employee, because he may be working for you in the afternoon and somebody else in the morning; but we will furnish him insurance and try to encourage him to insure himself.

So much for an outline of the state compensation insurance fund. We shall try to get a thorough, liberal-minded insurance man as manager, then let him select his staff and go at it, while we act as the board of directors merely.

Now as to the rates. They have been guesswork very largely heretofore. The policy of the insurance companies has deprived them of the advantage of their own experience, and hence they have little or no data to go on. When they insure a person under liability insurance they do not intend that the compensation paid shall bear any relation to the injury sustained. Not at all. They say, "Here, this fellow is flat on his back, with no money in the house, he has no friends, and he will take $100. This other fellow is hurt in just the same way, but he has friends and a little money, and one of his best friends is one of our patrons; hence, we will have to pay him $500." When settlements are made on that basis it deprives them of any value for rate-making purposes on a legitimate basis. We are therefore asking to have a rate-making bureau created. That bureau will consist of the manager of our state insurance fund; its actuary, the superintendent of the Department of Safety, of which I will speak in a few minutes; a representative from the office of the State Commissioner of Insurance, whose business it is to look after the solvency of concerns, and a representative of the other insuring companies that are allowed to do business in this state. These five men will be required and empowered to make rates—not compulsory, because we intend those rates to be competitive; they are compulsory only to the extent that every carrier doing an insurance business in this state must reserve on those rates. The claims reserve or the securities which evidence its investment, must be deposited with the State Treasurer, so that if an insurance carrier fails, the employers may lose one year's premium, but the injured men will not lose their compensation or their life pensions, because there will be money in the state treasury subject to the control of the Commissioner of Insurance to pay all of those claims. The rates are compulsory only so far as reserves are concerned; but the companies may charge any rate that they can and retain their solvency.

The rates relating to mining will be scheduled, much in the same manner as fire insurance rates are made. They charge a basic rate, and then an addition for each exposure. Our rate-making bureau will figure out, with the advice of mining engineers and others whose advice will be valuable, a standard mine, we will say, for the purpose of illustration. Then each mine will be rated; it will be credited for any element of safety in it which rises above the requirements of the standard mine, and will be penalized for every element of safety that is lacking to bring it up to this standard. Thus each mine will not pay a class rate, making the safe ones pay for the hazardous ones, but each mine will be rated on its own merits. We shall thus employ an invisible police to put into force the rules and regulations, of which I will speak in a moment, for the safety of those who work. That is, you will figure in this manner: "If I leave that thing as it is my rates will be so much; it will cost so much to put it as it ought to be; it will take so long for that difference to bear the cost. I guess it's a profitable investment to have it the way it ought to be." The disadvantage of a compulsory state insurance system is that, if it is made to apply to all men, it requires such tremendous machinery to see that all men are insured that it would break down almost of its own weight. In thousands of cases the premium would not equal the cost of getting it; but by making the rates apply this moral suasion, they become a silent and invisible police to enforce the law. It is self-interest that does it.

Now as to the Department of Safety. If the legislature can accomplish but one thing we hope this will be provided. California has done little in the way of safeguarding its machinery and training and disciplining its workmen. We will guarantee that if the legislature will give us the power we will cut in two the number of serious and fatal accidents within five years. The United States Steel Corporation took the subject so thoroughly in hand that they were able to reduce the number of accidents by 70% in three years; and a year and a half ago they promised to reduce it still further. It had been assumed that most of their accidents were inevitable, but they were not. It cost them about a million dollars, and other institutions, learning from them, have followed their example. I have been through large manufacturing plants in which about the only chance there was for a man to get hurt was to run into something with his eyes shut.

We shall ask the legislature to require that all employments and all places of employment shall be made safe. We shall not ask it to make laws specifying what constitutes safety, because such laws would hardly come into effect before many newer and better arrangements for securing safety will be developed. We shall ask the legislature to give our board power to determine what shall constitute safety. The mode of procedure will then be to engage a first-class mechanical engineer, who has given study to this problem, to compile the best rules he can find existing in the world. These will next be submitted to you as a tentative code of rules governing the mining industry. Then we shall hold hearings, at which the mining engineers, the mine owners, and the mine workers may be met, and their testimony taken as to the suitability of those rules. When all this expert advice has been heard thoroughly and fully, and the whole thing has been threshed out—which may take a couple of years—rules will be enacted and promulgated as to the safety of mines. These rules will have the force of law until they are changed; they can be changed at any time upon a petition for rehearing, so that they will constantly meet the requirements, where statutes would fail to do so. For example, the statutes of Illinois required that the safety arrangements around an emery wheel should leave just so much of an aperture. Accidents from bursting wheels continued to occur, whereupon the mathematicians and mechanics figured it again and decided to reduce the size of the opening. The law, however, required the old one to be used until the legislature could be brought to repeal the old law and pass a new one. This took a couple of years and cost many lives. A rule of that kind should be made to fit the need more easily.

New construction work will have to be approved; it must not be built regardless of life and safety. Failure of an employee to use a preventive device supplied by his employer, or if he discards it, cuts him off from his compensation, and punishes him if he can be made to suffer the penalty himself. We shall ask that museums of safety be established in San Francisco and Los Angeles; just what they will comprise is not yet settled, but we shall try to procure samples of all the safety devices as they come out, either photographs, drawings, or models, so that anyone interested can come and see the latest thing there is suited to his requirements. We shall also ask that our statistical department be extended to cover the farmers, and that the department be made permanent. We have a fair line on the accidents that happened in 1912, not including the farmer; but from the actuarial point of view the figures are of little value for fixing insurance rates, and ten years will be required to get an average line.

All this is going to cost something for the uses of the board, for the purpose of administering the law and settling disputes. During 1912 we had a thousand men under compensation, who were injured so that they lost more than a week of time, but we have not had to try ten cases here yet. They have nearly all been settled between the employee and the employer without coming to us. One feature is yet imperfect; as the law stands, you can settle with your injured employee in any way you please and we cannot stop you. Sometimes an employer says to his workman: "You can have your compensation, but which would you rather have, your compensation or your job?" Furthermore, men who have seldom had a lump sum in their hands are inclined to think that a lump sum is going to last always. That is the fault in quite a number of cases. They take the lump sum, start a grocery store somewhere, they fail, and in six months they are exactly where they would have been if they had received no compensation at all. We are going to require that every settlement shall be viséed by our Board, to ascertain that the compensations are practically such as the law prescribes, and that these lump sum settlements shall be made only where we can look into them, and see that they are wise.

For the administration of the board we are going to ask $80,990 for two years. For the surplus, as I explained, to start our compensation insurance fund, $100,000; for the home office expenses, during its period of organization, $136,840 for two years; for the Department of Safety, $68,740 for two years, to get that under way and make it of use, and if the legislature will let us do but one thing we want to do that. The rating bureau will be organized as I have already stated. Its five members will not draw salaries from the state, as members of the rating bureau, since all of them are under salary in their respective positions; but there will be clerks and a considerable working force, for which purpose we are asking for $25,000 for two years. The statistical department will take $25,560. That makes a total of $437,130, to cover the whole program for the next two years and organize an institution which we believe will solve the insurance problem; it will give the employers of California an opportunity to buy their insurance at what it is reasonably worth, and having that opportunity that is all they have a right to demand.

That, gentlemen, is the problem, and I shall be very glad to answer any questions about this program, or about the whole problem of workmen's compensation, that you may wish to ask.

Mr. Bain.—This plan relates only to accidents?

Mr. Pillsbury.—Yes, but a good deal more is coming. Germany collects and pays out in industrial insurance $260,000,000 a year; it virtually takes care of its working population from the cradle to the grave, because it begins with a pension for eight weeks to every working woman immediately before and after the birth of her child. It follows with sickness insurance in case of illness; compensation insurance; invalid insurance where the sickness extends over 26 weeks, or as long as the patient lives, in case of those chronic ailments which incapacitate him; ending with an old-age pension. All this has developed since the days of Bismarck, who scented what was in the air, and said, "No, we will not do those thing socialistically, but the Fatherland will do them paternally, and do them better;" and although Germany is more socialistic than any other nation in the world, yet the socialists have never directly written a line in its statutes. That $260,000,000 of social insurance collected and paid out means less than ½% of the year's turn over in business; hence the consensus of German business opinion is that the sum is too trifling to bother about.

Mr. Lawson.—Will there be a difference in the rates according to the number of dependents on the person insured?

Mr. Pillsbury.—We have a fourth bill for which two of us stand—not as a board but as individuals—aiming to prevent discrimination against the man who has a family. We are going to try to make it cost just as much to kill an unattached man as a man who has a family, wages being the same. From the testimony of some hundreds of men, we find it to be true that when one applies for a job, the employer asks, "Have you a family?" "Yes." "We will let you know if we want you." Then they do not let him know; thus of the 412 men killed outright in California in 1912, to 39 of them that were married there were 52 single. Now under the law as it is, it costs only $100 to kill an unattached man. We want it to cost just the same, because it is against public policy not to encourage family men. We are going to suggest that when there are no dependents the state shall be the dependent; and that the money thus paid to the state shall go to the credit of the Department of Safety. We think that the best use that can be made of the compensation to which a man would have been entitled, if he had been only irreparably injured, is to help prevent some other man from getting killed after him; such funds may go quite a way towards sustaining that department. We would prohibit the making of its insurance rate any cheaper simply because an establishment employs only unattached men. The application of such funds to the Department of Safety would also be to the advantage of the independent insurance carriers, since it would tend to reduce the number of accidents. Italy is the only country that has solved that problem, and we borrowed that idea from Italy.

Mr. Bradley.—Is the new act to apply to all classes of employees, or are there to be exceptions?

Mr. Pillsbury.—There won't be any exception if we can help it. The farmers are objecting, but I do not fear their opposition. They will do right when they know what is right, but it is hard to reach them collectively. I have had very good success with the farmers when I have had a chance to meet them.

Mr. Oliver.—Will there be any distinction between aliens and citizens?

Mr. Pillsbury.—No. I favored a distinction, but my associates outvoted me. I wanted the compensation of aliens to be paid in the same manner as the compensation of an unattached man, to the state; then let us find the dependents and pay them in their own country in such a proportion as the cost of living bears to the cost of living in California. Under this rule a Chinese would not recover his full three years' average annual earnings, to be sent to some child or parents in China, where it would make them rich, but we would send them the equivalent of what he would have earned had he been in his own country. In the proposed measure, however, there is no discrimination at all.

Mr. Bradley.—Will the new act reach the railroad companies?

Mr. Pillsbury.—Yes, except as covered by the Sutherland Bill, which has just been amended in the House. The Sutherland committee, during the last year and a half, has been holding hearings all over the country. It then passed through the Senate a law which will cover all interstate railroads that do any business at all. The House has just amended the Bill to include express companies as well as railroads. Whenever that law is enacted it will put under the jurisdiction of the United States all interstate carriers.

Mr. Bradley.—Will the new state act, that supplants the Roseberry Act, have anything to do with interstate business?

Mr. Pillsbury.—No, because we cannot have two jurisdictions. The national government, when it assumes jurisdiction in such matters, assumes exclusive jurisdiction, which, we think, will be very far-reaching. Some cases have gone so far as to hold that if a single car in a train is used for interstate commerce, the whole train comes under the protection of the interstate commerce law; similarly the repairer of that car comes under the protection of the Interstate Commerce Commission. Our street car system here in Oakland has 800 ft. of trackage that does an interstate business; and for that reason the company has to report on all of its business to the Interstate Commerce Commission. Whether the provisions of the interstate compensation law will extend over the whole system because of that 800 ft. of trackage, I cannot tell.

Mr. Requa.—Is it true that any railroad which has an interstate rate comes under the Interstate Commerce Commission? I know that in one case a narrow-gauge road, which could not exchange cars, but did have interstate rates that were occasionally used, for that reason had to report to the Interstate Commerce Commission.

Mr. Lawson.—If the state sells insurance at actual cost, how do you expect companies to succeed, which are in the business for a profit?

Mr. Pillsbury.—They have done it, and are now doing it in most of the countries of Europe. I happened to be in Massachusetts when that issue came up in the State Senate. There they are creating one great Massachusetts Mutual, which they wanted to make exclusive, and place under the control of all the employers of Massachusetts instead of the state; they also wished to give it a monopoly, but the insurance companies said, "No, we want the privilege of insuring under exactly the same terms, to be held to exactly the same accountability as your great Massachusetts Mutual, and we believe we can do business enough cheaper than this big state organization to afford us a fair profit. Whether they are making enough profit or not remains to be seen. In no country except Sweden has private enterprise been driven out of the field by this form of state insurance. In Sweden, however, the operating expenses are all paid out of the state treasury, and insurers there get their policies at net premium cost, not charged for any expense at all; yet even there state insurance has not altogether driven private enterprise out of the field.

Prof. Christy.—In Germany, what is the proportion of the insurance paid by the employer?

Mr. Pillsbury.—It is this way. They have a sickness benefit which provides for the first 13 weeks. To this fund the employers contribute one-third, and the employees two-thirds. When a person is injured he is taken care of as a sick man out of that benefit for the first 13 weeks, and 78% of all those who are hurt are cured within that 13 weeks. No account is kept in those institutions, except in Leipzig, as to those who are suffering from injuries, and those who are merely sick, so it is not possible to say exactly what the ratio is. It is found that the other 22%, who do not recover within 13 weeks, account for 84% of the entire expense; therefore the German employer maintains—which is probably true—that he pays more into the sick fund for the first thirteen weeks than is required to take care of the injured persons during that period. Hence he actually pays the whole compensation, and there is no contribution from the employee. It is believed, however, to be good policy to maintain that system because it brings the employer and employee together; they handle those sick relief associations and hospitals together, and they get along very harmoniously. It is good policy, but there is no saving in it to the employer; the employer bears the entire cost of compensation.

Mr. Requa.—Suppose I took a lease of a mining property, had an accident, killed two or three men, but was not in a position to pay any compensation; who does pay it? Is it taxed against that particular piece of mining property?

Mr. Pillsbury.—We shall not ask that this insurance be made compulsory in terms, because of the army of politicians needed to enforce it, and because of the immense cost if extended to all employers. But we propose to make it compulsory in effect by making the owner of each mine surety for the payment of compensation to his hired men, unless the subcontractor, or contractor, or lessee holds a policy in an insurance company allowed to do business in this state. In that case, when a complaint is made against the owner, he needs only to plead that policy to cause the insurance company to be substituted for him as defendant in the suit, and he goes free to the extent that the policy covers the compensation. There are what are called standard policies, which are limited to $5,000 for any one injury and $10,000 for any one accident. We are going to permit the employers in the state, under this law, who are first made the insurers of their men, to hire some one else to carry that insurance for them, or any part of it. We had an application a little while ago from a concern which wants to carry its own insurance, but does not wish to carry the catastrophe hazard itself, and it cannot now get any insurance company to insure its catastrophe hazard unless it will also insure its ordinary hazard. We propose to cover that contingency by making the owner surety for the principal contractor, the contractor surety for the subcontractor, and so on, clear down to the employer of the man who gets hurt; but each one of them will be liberated from responsibility as soon as he shows that the one below him carries an insurance policy. The purpose of that plan is to make the owner see to it that his lessee, or any contractor working upon his property, holds an insurance policy; he becomes the policeman who compels insurance. The experience of the world has shown that this scheme works like a charm, till you get down to the ranks of the "submerged tenth"; but when the provident are all insured, then in any session of the legislature we can compel the remaining small percentage to insure.

Mr. Requa.—It might easily happen that the owner of a mine would not have sufficient money to pay for one or two serious accidents, and that his property itself would not be worth the price. Suppose then that the operator of the property has no money either; then what are you going to do?

Mr. Pillsbury.—Nothing, until we can compel some kind of insurance. Fifty-one men cannot make 49 do what they do not want to do, but 75 can perhaps make 25 do it.

Mr. Requa.—Then you have to create compulsory insurance to take care of that contingency?

Mr. Pillsbury.—Yes. Denmark has solved that problem by making a law to the effect that every employer whose assessed valuation falls below $1,608 must insure not only everyone he employs, but must insure himself and the working members of his family, with the state; the state takes his insurance at $1.35 a head—quite a limited compensation in this case—and if this does not bring in enough to meet the cost of the insurance, the state makes up the deficit out of the public treasury.

Mr. Burch.—I understood you to say that this law proposes that all accidents shall now be brought before the State Accident Board for settlement?

Mr. Pillsbury.—No; we expect, during the first two years of its operation, that we shall get about three cases out of a hundred instead of only one.

Mr. Burch.—But every employer must place himself in the control of the Board?

Mr. Pillsbury.—Every settlement must be viséed by our board before it relieves the employer of liability. A document is first drawn up, containing a statement of the nature of the injury, approved by the attending physician, a statement as to how long the injured person was disabled, and what his wages were. The parties having agreed to that statement, both sign it, their signatures being authenticated by two disinterested witnesses, and it is then forwarded to the Board. The Board will go over it and see if the compensations granted are such as the law provides. If they are, the settlement is simply approved, and that is all there is to it. There is no expense to anybody.

Mr. Burch.—The reason I ask is this. I find now that if I wish to place myself under the operation of the Roseberry Act, I have to pay to a liability insurance company $8.40 per $100 of the pay-roll. If I do not place myself under the provisions of the Roseberry Act it is $3.75 on the $100 of the payroll. Will not the proposed law result in a higher rate of insurance in the future than we are paying to-day?

Mr. Pillsbury.—I cannot answer you as to mining. I cannot even guess what the insurance rates under the new system will be. There are reasons why it may cost more. Under your present system of liability insurance you do not insure the injured man at all; he is not a party to your transaction, but only the victim of it. The liability company insures you against the consequences of lawsuits. It says to you: "You are employing men in a dangerous occupation; some of them are going to get hurt, and will sue you for damages. If you pay us so much, we will engage attorneys to fight those claims, unless we can settle for less than it will cost us to fight them." It takes four years and seven months to get a case through the San Francisco courts, a little less in Los Angeles, by which time the injured man has suffered all the disabilities he could expect to suffer anyway, and if he does eventually win his case his lawyer gets half of the proceeds.

Only about 25 to 30% of what the employer pays out for liability insurance reaches the injured man under the present law. This form of insurance is immoral. It has been swept out of Europe. It does not exist in Great Britain, nor in hardly any of the British colonies, nor anywhere else except in some of the Latin-American states; even Peru has turned its face against it and has adopted a compensation law.

While I cannot tell you exactly what the rate will be, it will be cheaper in one way: it will cost a great deal less to provide the insurance. Insurance, you know, is simply a gathering up of money, putting it into a hat, and paying it out to those who are hurt. It is applied Christianity when it is managed properly. There is no more beneficent institution in the world than one which insures the right man against the right thing. A year and a half ago I went to the head offices in New York, Hartford, and Boston, to learn the insurance side of the question from the men at the head. They admitted to me that if they had a $5,000 loss to pay they had to collect $10,000 in premiums from other people in order to pay it; that the mere putting of the money into the hat and taking it out again absorbed half of it. As a matter of fact, it took 51% that year, and sometimes it takes more; at best it is an extravagant way of doing business. What this law proposes is to insure an injured man against the consequences of being hurt. When the employer has paid his premium he has done all that the state asks him to do, and his credit is relieved from any further burden whatever in the matter. Practically all that he pays will go to the injured man, since a great deal of the commission will be eliminated.

I forgot to mention that we have proposed another bill, providing for mutual insurance, by which you mining men, if you wish to, may organize a mutual company and carry your own insurance absolutely at cost, if you can do it cheaper than the state. Throughout Europe the great bulk of insurance is being carried by mutuals, which are admirably managed. Your mutual insurance company, however, must maintain a reserve just like the others; it must obey the same rules, and must reserve on those rates just like the others.

The proposed form of insurance may cost somewhat more than ordinary liability insurance, but many compensating advantages will become manifest. Employers will attract, in the course of time, as they have found elsewhere, a better class of men and will get better work from them. One feature that has been noticeable in Germany is the quietness and contentment of the workmen, knowing that if anything happens to them, those they leave will be provided for; and for that reason they render better service.

Great Britain found German manufactures of all kinds in her own markets, and Parliament sent a commission over to make a study of this question. This commission reported back that poverty, as they knew it in Great Britain, had practically ceased to exist in Germany. Great Britain, therefore, had to choose between two courses, either to pick a quarrel and sweep German commerce from the sea with her navy, or adopt the German system of caring for her work people. They concluded to do the latter, and on July 12, 1912, Lloyd George put into operation the whole German system of social insurance, with a new feature added. Germany has never yet insured against unemployment, but the English system insures against everything that Germany does, and unemployment besides.

Prof. Christy.—May I ask who pays the bill?

Mr. Pillsbury.—It is paid partly by the employer, dollar for dollar with the employee, and the government makes a small contribution. In Germany, of $260,000,000 paid for social insurance the government contributes about $10,000,000. The English system does not pay much more than that, but the government does contribute something, not on compensation, but under the form of sick benefits and unemployment insurance.

Mr. Oliver.—Will the employees pay any part of these benefits?

Mr. Pillsbury.—No. Suppose a man 30 years old loses a hand by an accident. Your present form of insurance will carry him for 240 weeks, until he is 34½ years of age, when his expectation of life will be 35 years, during which he must get on as he may, minus one hand. We feel that this is contribution enough on his part. The employer has tided him over 4½ years out of 40 years of expected active life, and has left him to carry the rest. The time will come when these compensations will be true compensations, because they will be based on this principle, which is eternally right, that he who has contributed a hand, an arm, a leg, an eye, or his life, to an industry is just as much entitled to be compensated for his contribution as he who has contributed labor, or capital, or raw material, or anything else that went into that industry; and for the reason that the element of blame, upon which the doctrine of negligence was founded, is so small as to be negligible. Of every 100 accidents occurring in Germany during 20 years, 15 were attributable to the negligence of the employer; 35 to the negligence of the hired man; three to the combined negligence of them both; five to the negligence or want of reasonable care on the part of a fellow-servant; while 42 were trade risks—those mishaps which no human foresight could prevent. Now, of these 58 which had a human origin, in less than five was there such a degree of negligence as would justify either mulcting the employer or depriving the employee of his compensation. The fact is that the mind does not at all times have the body in its control. The mind jumps thousands of miles in a second; it will be gone, perhaps, the fraction of a second, and the accident happens. You may watch the railroad engineers go past the stop signals; and why? Because, do all they can, they cannot keep their minds riveted on their duties. These accidents are the product of our common human nature. When an accident occurs through wilful disregard by an employer for the life and health of his employee, the employee may sue him for damages. In cases of that kind, under our proposed law, we will permit an employee to recover from the insurance company, and the insurance company to subrogate to the rights of the employee against the employer, to recover the amount of insurance paid for injuries sustained.

Then there are cases of wilful misconduct, which will deprive an employee of his compensation, but such cases of really culpable negligence, whether of employer or employee, will not, both together, amount to 5% of all accidents which happen through negligence. Therefore, the world has discarded negligence as the foundation for dealing with what was the third greatest cause of poverty in the world, until this new movement started throughout Europe. Industrial accident has been the third greatest cause of poverty in the world, and 5% of such accidents furnishes too small a foundation upon which to rear a superstructure to take care of that problem. That is why the world gave it up and adopted compensation.

Prof. Christy.—What would you say about the case of the *Los Angeles Times* explosion, where about 20 employees of the *Times* were blown to eternity by the act of dynamiters? Would the *Times* be liable for the destruction of those men, under this law?

Mr. Pillsbury.—Yes, I presume so. When a person meets his death in the course of his employment the employer becomes his insurer. The proposed law contemplates that every sane employer will insure, unless he is big enough to carry his own insurance. Any employer who would have to pay more for insurance premiums than for compensation does not require to be insured; but the basic principle of this proposal is that each industry must care for its own killed and wounded. The only way for the mining industry to do that, as an industry, is to insure; and when a rate is made for mining, and you insure at that rate, then the mining industry assumes and carries its burden as an industry, not as individuals. It is commonly said that property which is not worth insuring is not worth owning. The business that will not stand insurance is an unprofitable industry.

Prof. Christy.—I asked this question. These employees were dynamited confessedly by persons who did it for the purpose of destroying the lives of the operatives. Does that make the owner of the *Times* liable for that accident?

Mr. Pillsbury.—I am not sure that I can answer that question, but there is this about it. If two men go to fighting, and one hurts or kills the other while they are at work, the employer is not responsible, but neither is the insurance company. In England they take this view: where an injury is inflicted through crime directed at the workman himself, because the person who inflicted the injury intended to hurt him, the employer is not held to be responsible. It is a crime merely. But where it is directed at the plant, as in an attack to destroy the property of the employer, and the employee is working in the line of his duty, the employer is responsible. The English courts have so held in a great many cases. For instance, a locomotive engineer is at his engine; somebody throws a rock through the cab window, hitting the engineer and hurting him. The railroad company is responsible, because that rock was thrown, not at the engineer, but at the railroad; there is quite a long line of such decisions.

Prof. Christy.—The matter is really very important; it strikes at the root of many industries. Suppose in the case of a strike, for example, some one had a grudge against a mine owner, and should deliberately set off a dynamite explosion and kill 50 men; that would ruin any ordinary company. It seems as though compensation would work a substantial injustice against the employer. The argument seems to me a little fallacious that each industry should bear its own burden of dead and wounded. An industry like that of mining, which requires the expenditure of vast sums of money with a very great uncertainty as to final reward, may be a total failure, and yet the development of the country depends on this industry; it is absolutely necessary for civilization that the mines should be opened and worked. The whole community owes a debt to the mining industry. It seems to me, therefore, that the fair thing is to divide the expense roughly in equal proportions. The principle of insurance is right; it is human and sane and necessary; but the expense ought not to be borne entirely by the mine owners. Of course, you may say that an injured workman contributes a hand, but many of them do not lose anything; they have a regular living and don't happen to be injured, but yet the employer has to pay insurance for them all. It seems to me that if the state paid a third, the employees a third, and the mine owners a third, it would be perfectly fair. It is right that the state should pay something. Your answer may be, "You can raise the price of your product." We cannot do so in a state competing with other states. I know for a fact that a large number of the mines in this state will be forced out of business if they have to carry any more loads than they carry now. Perhaps you say, "It is better they should be closed." But if that should happen, a large army of men now employed at remunerative wages—they are paid higher wages, on account of the risks they run, than men of equal skill in other employments—would be thrown on the public, and the public would have to take care of them. It seems to me that to put the whole burden on the employer has in it an element of injustice, and tends to encourage improvidence in the workmen. Every man ought, if possible, to pay a portion of his own insurance; and I suppose if the employer alone has to pay this insurance, wages, in the long run, will fall, while if the employer pays only part, and the workmen pay part, wages will be raised or will remain permanently higher. In the long run, I suppose these things even up; but, at least while putting the plan into operation, some provision ought to be made not to lay more burden on one who is risking his capital and even his own life, in many cases. It seems to me that the weak point in the system is the proposal to put the entire tax on the employer.

I notice that a bill now before the legislature exempts farmers from this Act; in fact, exempts all employers of not over five workmen. If that bill were to pass, exempting certain industries from the Act, would that not make the whole act unconstitutional?

Mr. Pillsbury.—Let me answer the last question first. Our board will fight any exemptions from the law as hard as we can; and if we can only reach the farmers we shall prove to them that being under compensation is cheaper than to pay their own insurance. We shall oppose exemption; but it will not render the Act unconstitutional if they pass it, because the Supreme Court has decided that you may classify, so long as you do not discriminate. Special legislation is unconstitutional in this state, but we may make as many classes of counties as there are counties, and legislate for each class. Some states have exempted the farmer for that reason alone. No one would assert that a man who lost two fingers while working on a thresher is less entitled to compensation than if he had lost them in a planing mill. This exemption will violate the sense of justice and will create enmity between the farmer and every other employer, and between every other employee and his own. Most other countries exempted the farmers at the outset. They applied compensation first to the more hazardous industries, mining and seafaring, because these were the ones that were sending injured persons broadcast to be cared for. Soon the farmers of Germany asked to have the law extended to them, because what they called "farm flight" was driving away all their good help and leaving them the residue of all creation, and this condition was costing them vastly more than the insurance. There are 17,000,000 of German farmers and farm laborers under insurance now. So it is in Great Britain and most of her colonies, and in the continental countries of Europe, where machinery is used.

Now, I would like to take up another issue. The mine owners will not pay this bill; the employers will not pay it; neither will the consumer pay it, in the long run. It is the employee who pays it all. Men are sometimes hired at so much a month and their board; now the world is hiring men at so much per, with sick benefit, compensation benefit, invalid benefit, old-age benefit, and unemployment benefit as a part of the wages. Thus, in the last analysis the employee pays it all. I thought I had made it clear that all an employer is asked to do in the first instance is to tide his workman over a period of adversity; the injured man bears the pain and suffering, and he bears the maiming for the rest of his life, in comparison with which the part that the employer bears is a bagatelle. The easiest thing in the world to pauperize is an industry. We started years ago to build up certain infant industries in this country by a protective tariff; but now when you try to take the nipple away from them how those infants do squeal! Apparently, the world will come to an end if they lose the bottle; and there is not an industry which feels that it can stand on its own feet. It is time to have done with subsidies. And where is your subsidy coming from, to support your mines that cannot otherwise be worked? Your subsidy comes from the crushed bones and the blood of your hired men, from the widows that you make, and the children that you pauperize. If that is what is keeping your mines alive, for God's sake, close them. It is against public policy to keep them going. You tell me that the world cannot move without mines; yet when I talk to farmers they say, "Why, we are running the world; you could not work your mines if we did not furnish you something to eat."

This problem is not new. The same question that Prof. Christy asked me has been asked in every country that has tried compensation, and in every industry, and they have always found some way to meet the difficulty. I cannot tell you the way, but you will find it. You will discard the drinking man; you will get better help. You and your men will not have to worry, and that will make new conditions, and lengthen the days and better the service of the men who work for you. As to a contribution from the state! It is useless to ask the legislature at Sacramento to provide a third of this expense, when they are put to it for money to carry on the simplest operations of government; we even have to fight to get an appropriation of $100,000 to start with, to enable us to furnish you with insurance at what it costs the state.

Prof. Lawson.—What is the status of the state as an employer of labor?

Mr. Pillsbury.—Like that of any other employer. That issue is dodged in California, partly through oversight. But most legislatures have put the state and its political subdivisions under the Act right at the start.

Prof. Lawson.—Is the Act limited to manual labor?

Mr. Pillsbury.—No. It applies to any person who works for another under any contract of hiring, expressed or implied, oral or written, except a public official, who is elected or appointed for a definite term.

As to the principle that each industry should take care of its own killed and wounded, I can say that the world has found this to be the best place to put that burden. The farmers just now are clamoring for the state to carry it; but I have this information for the farmer, and am sorry that I haven't similar data for the miner. If compensation were paid out of a general property tax all over the state, the farmer would pay one-third of its cost; now, while the farming population suffers 45% of the total accidents, the average injuries are less severe, and absorb only 20% of the total cost for compensation. Hence, under a general property tax for this purpose, the farmers would pay 33⅓%, whereas if they paid for the insurance themselves, they would have to pay only 20% of the total burden. Considering the farmer as consumer, he would, by indirect taxation, pay 38.2% of the whole cost in order to cover the 20% for which he is responsible. Farmers do a good deal of that kind of financing, but I do not think that mine owners indulge in much of it.

Prof. Christy.—Mr. Pillsbury has made a most eloquent defense of his cause, but I still have a question as to why the German and English governments both contribute a portion.

Mr. Pillsbury.—They do not contribute towards the compensation fund, but towards the old-age fund. For instance, the management of this Board, the assistance that it requires, the management of the safety department, the collection of statistics, the bureau of rating, all those expenses come out of the general tax; the state contributes in that way. Germany thus contributes about 4%, but it is expended for administration and nothing else. In California the state will, of course, administer these matters out of its own funds. Employers do not have to pay for that.

Mr. Wilson.—What effect will the new plan have on the cost of maintaining paupers?

Mr. Pillsbury.—There, an element of cost is saved. A queer thing occurred in Germany; they found that there was no pauperism such as they experienced before, but yet the pauper bill was bigger than ever. On investigation they found that while the same amount of pauperism did not exist as previously, yet they were expending more for poor relief by managing it on a higher plane; that is, by removing the causes of poverty, by taking better care of the decrepit, putting them in the way of earning their own living, so that they could take care of themselves.

Mr. Wilson.—The point I had in mind was along the same lines that Prof. Christy mentioned. If, for example, the state were now paying 20%, would it not disturb the balance less if the state were to contribute the same amount under the new system?

Mr. Pillsbury.—There are those who wish the state to bear the operating expenses of our state insurance fund. That would mean that the state would have to do the whole insuring, and would be in danger of losing its power of enterprise, for lack of competition; it would also very likely cost the state more than if the state did not undertake the business; that is, you could not buy your insurance so cheap. It is conducive to cheaper rates, in the long run, to have competition; that has been the experience.

It has been objected that this system will discourage men about being careful not to get hurt. It is not so, because, as a part of the plan, goes the training to prevent their getting hurt, the discipline, the weeding out of the careless and heedless, the employment of safer men, because your accident experience will have a certain influence in fixing your rate as the years go by. In the United States Steel Corporation's works they give cigars to the men, but around each cigar is a label bearing a motto of some kind to remind the smoker that he is responsible, not only for his own escape from injury, but for the safety of his fellow-workmen. Every pay envelope has something printed in red ink to remind the man who received it that he must not get hurt. Every foreman understands that his chances for advancement depend on the number of his men who do not get hurt.

Mr. Burch.—Would it not be a still further incentive to the prevention of accidents if the employees were to pay part of the cost of insurance, knowing that the fewer the accidents the lower would be their rate of insurance?

Mr. Pillsbury.—Really it does not make much difference whether they contribute or not, except on the ground that cooperation in the administration of the sick benefits, for instance, brings employer and employee together. When the workmen get it into their heads, as they are now doing, that compensation is an absolute right, then it spoils any moral advantage that the employers might enjoy if you extort from them a part of that compensation fund. They feel that they ought not to pay it; that they are taking a ten-times greater risk than you are; that you can afford the added expense, and can pass it on. Of course, gold miners think that gold can not be made to cost any more, but I understand it works just the other way. Whatever makes gold cheaper raises prices; whatever makes gold dearer reduces prices. Nearly all the gold-producing countries of the world are under compensation: the Transvaal, nearly all Australia and British Columbia, and many others. Thus the gold industry is carrying the burden, and if it adds anything to the cost of gold, that means that the commodities which you buy to run your mines are cheaper. Thus you pass it on, but not to the consumer; the producer bears that burden because he gets, in the long run, that much less for his product. In almost every other instance the consumer generally has to pay it.

Prof. Christy.—Can you give us an idea as to the outside limits of the cost of this insurance per man per year? Would it be as much as $8.40 per $100 pay-roll?

Mr. Pillsbury.—We have not understood that it would be any such amount as that. The insurance companies, when they fixed the rates for compensation insurance, did not have any data on which to base rates, and wanted to be sure to make them high enough. They did not like the scheme very well, as it was interfering with their business; hence they multiplied by all the way from 1½ to 28 times as much as they charged for liability insurance. The new rates will be somewhat higher than liability insurance ought to be; but nobody knows what liability insurance ought to be, least of all the insurance companies themselves. It is merely guess work with them, and they try to guess high enough to be on the safe side.

The only data they have that is of any value is what is called collective insurance, and yet a certain big insurance company doing business in this state has had only one risk of this kind in its history. Down South, where they had to depend on negro labor, collective insurance had quite a vogue, for the reason that the employer simply took the premium out of the negro's pay. White men would strike, but the negroes paid the insurance; that offered a slight line of experience to go on, but it touched only a few industries and a few people.

Prof. Christy.—What is the rate in England and Germany?

Mr. Pillsbury.—The average rate in Germany, where the schedule is a little higher than ours, is about 2% on the pay-roll, that is, for all industries. Farmers over there pay a little less than 1% on the pay-roll; in France the rate averages about 3% on the pay-roll. I cannot call to mind just what the rate is in Great Britain, but it is somewhere about 2%. Prof. Whitney, our mathematical adviser during this investigation, figures that the average under our proposed new schedule will not exceed 2½% for all industries; we are figuring on the farmers now, and find that their rate cannot be over $1.25 per $100, and it will probably be $1.00 or a little lower. It will probably be a little more than the present liability rates, but it will not be anything like $8.40. It may take 10 years to learn what it ought to be. If we then find that these class rates are too high, the excess will be repaid.

Mr. Benjamin.—Does this bill contemplate making the employer responsible for a mine accident, irrespective of its cause or of the condition that permits it?

Mr. Pillsbury.—He will be responsible unless the accident is brought about by the willful misconduct of the person himself who is hurt, and even then he is responsible to all other persons. The world has very narrowly construed the meaning of "willful misconduct." Those are trade risks which the employer is bound to assume as representing the industry; that is, the industry assumes responsibility through insurance, although it is laid upon the employer first. That idea has been borrowed from Great Britain.

The Germans and the British have two diametrically opposite views of this question. Germany says that the industry shall bear the expense in such words as these: "You members of the mining industry shall organize a mutual association; you shall carry your own insurance, and if you do not, you shall not mine." And your mine is kept closed until you have joined the association of your district; thus they compel the industry to bear the expense of insurance by act of government. It did not come about in an arbitrary manner, exactly, because the system had been developing through their Guilds. Germany pays these compensations through the post offices. At the end of the year it then draws a requisition to repay whatever it has distributed on behalf of mining accidents, and the Miners' Mutuals have to refund it; but they manage those associations as democratically as they wish.

Great Britain has a better developed idea of individual liberty; they do not have that habit of obeying the government without question, that prevails in Germany. Hence, the British government says to the employer, "I am going to make you the insurer of your men. You can do just as you please about managing that matter. You can hire some company to carry your insurance for you, or you can organize mutuals; you can do anything you want, but you must see to it that your injured men are paid somehow." We have similar ideas throughout this country, because our inheritance of law and government is British, not German. For that reason, the German system would not work so well with us.

Mr. Read.—Such questions of negligence as arise are adjudicated by your Board and not by the courts?

Mr. Pillsbury.—Yes, the courts are blocked. As I tried to explain, they can't do the work. Our Board has to be quasi-judicial. It has been found, even in England, where the court hears the cases, it can not do it as a court, but as a referee.

Prof. Christy.—I understand that if state insurance is adopted, any mining company or corporation which pays insurance is released from all further liability, is it not?

Mr. Pillsbury.—Only to the extent to which it is insured. For instance, if you take the standard policy of insurance, then you are released up to the amount of $5,000 for any one injury or $10,000 for any one accident. In addition, there is the catastrophe hazard. In order to be released altogether, you must take an unlimited policy. In Massachusetts they will not permit any other policy; there an employer must insure for the whole amount. The insurance companies, to meet that requirement, have made a pool of $1,000,000, and have placed it in the hands of a Board simply to take care of these calamity hazards. We did not think it best to require every employer to carry an unlimited policy; we let him use his judgment. But actually that calamity hazard costs but a few cents extra per $100 of annual pay-roll, yet a good many employers do not want to pay it; they feel that the risk is not great. If, however, you employ 25 or 30 men in a place where you are likely to have a cave-in and kill them all, you had better take out the unlimited policy. The large insurance companies have made this arrangement: they carry the standard policy themselves, but they reinsure themselves in certain great European organizations which make a business of insuring this calamity hazard. Some companies have already arranged for reinsurance under the new law, expecting it to be made compulsory. I do not know whether our state fund can make that arrangement or not; if not, we cannot insure against hazard until we raise a fund of our own.

Mr. Oliver.—How about soldiers? They are employees of the community.

Mr. Pillsbury.—The Act excepts the State naval forces and militia, serving as such.

Mr. Oliver.—The police force?

Mr. Pillsbury.—That depends on the charters of the municipalities. If a city has a system of pensions, the Act will not apply to it, but will apply to any city which makes no provision for pensions, so that policemen and firemen will be under the protection of the law.

Prof. Christy.—The time has now arrived for closing this discussion, and I think we all agree that the legislation proposed by Mr. Pillsbury is an improvement over the present existing Roseberry Act. But there may be a difference of opinion as to the wisdom of some of the provisions of the proposed law.

One of the first objections that may be urged against it is that it is too paternalistic; that it treats the workman as if he were an irresponsible child; that it puts a premium upon incompetence and lack of forethought; and that it opposes that free initiative which has done so much toward making the American workman superior to the European workman of the same class.

Take, for instance, the proposal to put the entire cost of insurance upon the employer. This removes all responsibility for insurance from the workman, although it may be true, as Mr. Pillsbury has pointed out, in the last analysis it is the workman himself who pays his own insurance, by indirect means. In short, if the employer pays the insurance, in the long run it means that the employee will work for lower wages; while, on the other hand, if the workman pays a part of his own insurance, in the long run he will receive higher wages. The point that I wish to make is that it is not a matter of indifference which system we use; that in my judgment it is better for the workman himself to receive higher wages, and consciously to pay a portion of the cost of his own insurance out of his own wages, than to make the employer responsible for the whole sum, and then cause the employee actually to pay the whole cost of the insurance indirectly through his lowered wages. It seems to me that the moral effect, in the increased self-respect of the workman, is to be preferred.

However, this is not the most important defect of the law; a much more striking defect is the shirking of all responsibility for insurance by the general public. Mr. Pillsbury points out that the risk among farming laborers is less than that among mining laborers. This is of course true, but probably no one in the whole community benefits more from the mining industry than the farmer. How would the farmer carry on his industry without the steel plow, which has been dug out of the earth at the risk of the miner? What would he do without the agricultural machinery which has been made possible through the mining industry? What would he do without the electrical appliances which have so changed the general aspect of farming in the past decade? In short, the farmer, probably more than any other individual in the community, benefits more without any increased risk to himself. In a similar manner, the editor in his easy chair, the doctor, the lawyer, and every other member of the community, benefits from the activity of the miner without sharing any of his risk.

Mr. Pillsbury has pointed out, in the long run, that things even up and that the consumer pays for the increased cost of insurance, in an indirect way. While this is actually true, a great injury will be done in the sudden passing of this law. It will amount, in many cases, to the virtual confiscation of a large number of mining properties which will be rendered worthless by the sudden application of this law. The proposed law, it seems to me, is weak in not providing an adjustment along these lines.

Mr. Pillsbury tried to make out an analogy between the mining industry and the protected, tariff-fed, "infant" industries. The mining industry, as a whole, has never asked for any tariff protection. It does not even ask for privileges. It simply asks to be allowed to work out its own salvation without undue interference, and without having to meet artificial, man-made difficulties.

Mr. Pillsbury says: "It is time to have done with subsidies. And where is your subsidy coming from, to support your mines that can not otherwise be worked? Your subsidy comes from the crushed bones and the blood of your hired men, from the widows that you make, and the children that you pauperize. If that is what is keeping your mines alive, for God's sake close them."

Now, this sounds very forcible and final, but when we come to examine it we find it is not true. The miner, on account of the risk he runs, is paid higher wages than a man with equal skill in any other profession. As a rule, he works shorter hours. In California, eight hours is the maximum, and where the work is difficult, the hours are frequently less. The farm laborer often has to work from 12 to 16 hours a day, and also runs some risk of injury, but he receives a mere pittance compared to what the miner earns. The mining industry does not ask for subsidies, direct or indirect, it asks only that the conditions of the law be made fair to all parties, and that every individual in the community shall pay his share of the cost of the insurance in proportion to his share in the profits.

Another serious defect in the proposed law is that it does not insure against catastrophies. This is really the most serious difficulty that the mining industry has to meet. If the proposed law fairly met this difficulty, all of the other objections might be ignored. One can foresee, and even provide for individual accidents, but these larger catastrophies it is impossible to foresee and protect against, and as I understand the proposed law, it does not attempt this at all.

Further, if I understand Mr. Pillsbury right, in his answer to my question regarding the responsibilty of the owner for the injuries caused by the dynamite explosion which destroyed the building of the *Los Angeles Times,* the new law makes an employer responsible for such murders. It seems to me that this is a fatal defect in the law, for if anyone should be responsible it should be the state, for allowing such conspiracies to exist, and to be carried to a final issue. In cases of this kind, it seems to me that the whole community should be made responsible for the entire loss, not only to the injured employees but to the employers as well.

It is perhaps too much to expect perfection in any human endeavor, but I think it no more than fair to point out some of the clear defects in this proposed legislation.

I am sure that I voice the opinion of all here present, when I express our thanks to Mr. Pillsbury for his interesting and able discusssion on the question before us. Personally, I am in favor of the state's entering into the business of accident insurance in open competition with private companies, and if this new law could be so modified that the employers, employees and the state could contribute in fairly equal terms, at least to the extent provided by the laws now in force both in England and Germany, it would seem to me that it would be one of the wisest pieces of constructive legislation in our times.

Mr. Bain.—I move that this meeting pass a rising vote of thanks to Mr. Pillsbury for his very able address.

This motion was unanimously passed by a rising vote, and the section then adjourned.

H. FOSTER BAIN,
Secretary of Section.

JOHN FRITZ

A Tribute by Henry S. Drinker.

A great man has left us—one as highly loved as he was esteemed, and looked up to not only in his native land but throughout all lands where advancing civilization has made its mark in industrial growth and in the development of natural resources. His triumphs were those of peace. He was a general in the industrial armies which, with ever increasing strength, placed our nation in the fore-front of progress. Self-made, self-educated, humble, yet self-reliant and resourceful, superlatively able, kindly, a loving father and a staunch friend,—loved by all who knew him,—he spread about him, and exerted far beyond his immediate sphere of action an influence for good that was incalculably great.

He died a modest citizen of a great Republic, crowned with honors that never king or potentate was privileged to bear, an inspiration to his fellows, an example to our youth.

John Fritz was born August 21, 1822, in Londonderry Township, Chester County, Pennsylvania. He died at Bethlehem, Pennsylvania, on February 13, 1913, in his ninety-first year. His father, George Fritz, a native of Germany, came to America in 1802 and married Mary Maharg, a native of Pennsylvania, in 1821. Hence John Fritz came of mixed German and American blood.

His intensely interesting autobiography, published in 1911, is a work of surpassing literary merit in its simple yet direct and well-expressed narrative of a busy and extraordinarily useful life. Of it he says in his modest preface,

> "You must not expect fine language nor eloquent periods, but only the honest record of the hard-working life of one who loves his country and his fellow-men, and who has tried to serve both."

His early youth was spent on the farm, and his schooling was that of the country school of long ago. But he was highly self-educated and a born engineer with an innate taste for mechanics which led him early in life to leave the farm and, after an apprenticeship at blacksmithing and country machine work in Chester County, to seek work in the iron mills of Pennsylvania. He first secured employment in a rolling mill at Norristown, where by his steadiness and intelligence, and his zeal for work, he soon rose to the superintendency of the mill and made influential friends who stood loyally by him in his early professional life.

Later he held important positions in rail-mill and blast-furnace work at Safe Harbor, again at Norristown, at Kunzie Furnace on the Schuylkill River, with also a short experience with his brother George and two brothers-in-law in building a machine shop and foundry at Catasauqua.

In June, 1854, Mr. Fritz went to Johnstown, Pa., to take the superintendency of the Cambria Iron Works. His experience there as given in his Autobiography is a notable record of great original achievement in the face of difficulties that only a man of steadfast will, iron determination, and pre-eminent ability could have overcome. There, against the opposition of his engineering friends and his workmen, with only half-hearted support from his employers, he developed his three-high mill, which revolutionized the business, insured the prosperity of the company, and stamped John Fritz as the recognized leader in mill work, which he remained all his life.

He remained six years with the Cambria Iron Company, and in 1860 accepted a call from the Bethlehem Iron Company to take charge of the construction and operation of that company's works, where he remained until his retirement from active business in 1892.

At Bethlehem he was the leading spirit in the introduction and development of armor plate and gun manufacture in America, in which the Bethlehem Iron Company—now Bethlehem Steel Company—took so early and leading a part, and it was in August, 1892, that his engineering friends and men prominent in all walks of life assembled at Bethlehem to celebrate his seventieth birthday and to do honor to him. His eightieth birthday was celebrated by a similar gathering in New York in October, 1902, where, at a dinner held at the Waldorf-Astoria, he was awarded, as its first incipient, the John Fritz Medal, established by his professional associates and friends and awarded by the four great national engineering societies for notable scientific or industrial achievement.

It was the wish of Mr. Fritz's friends to celebrate his ninetieth birthday in 1912 by an even greater gathering, but the illness and increasing weakness which came on him in the early spring of 1912 prevented this. Despite the best of medical and surgical care his strength gradually gave way until finally the end came. His funeral was attended by hosts of friends and by delegations from the societies and institutions with which he had been connected.

Mr. Fritz was intensely interested in education and as a trustee of Lehigh University gave freely of his time and means to the development of higher technical education from the opening of the institution in 1866 until his death. In 1909 he announced his intention of building and equipping an engineering laboratory for the University, and he gave his personal attention to the designing and erection of the building and the procurement and installation of the equipment, and, in addition to the large expenditure this entailed, it was found at his death that by his will he had left to the University the sum of $150,000 as an endowment for the maintenance and operation of the laboratory.

By his will, after making due provision for relatives (he left no immediate family), he made liberal bequests to various other institutions and charities.

During his lifetime he held, in 1894, the Presidency of the American Institute of Mining Engineers; in 1895-6, the Presidency of the American Society of Mechanical Engineers, of which body he was an honorary member. He was also an honorary member of the American Society of Civil Engineers, of the Iron and Steel Institute of Great Britain, and of the American Iron and Steel Institute. He was also elected, in 1909, an honorary Vice-President for life of the Iron and Steel Institute of Great Britain. In 1893 he was awarded the Bessemer gold medal of that Institute. He held the following honorary degrees: Columbia University, A. M., 1895; University of Pennsylvania, D. Sc., 1906; Stevens Institute of Technology, D. Eng., 1907; Temple University, D. Sc., 1911.

PERSONALS

Waldemar Lindgren is chairman of the committee on economic geology of the A. I. M. E., which was organized at a recent meeting of the geological members of the Institute and which aims to encourage contributions and to promote discussions on the subject of economic and mining geology. J. W. Finch and R. A. F. Penrose, Jr., are vice-chairmen, and L. C. Graton is secretary. The committee includes a number of the Society's members.

R. W. Brock is general secretary of the Twelfth Session of the International Geological Congress, which will begin at Toronto on Aug. 7, 1913. Messrs. Kemp, Lindgren and Winchell have accepted the invitation to attend this Congress as delegates of the Mining and Metallurgical Society.

H. C. Bellinger has been elected vice-president of the Australasian Institute of Mining Engineers.

Albert Burch has been appointed superintendent of the Goldfield Consolidated Mining Co., in place of J. F. Thorn, resigned.

H. W. Du Bois read a paper before the recent meeting of the Canadian Mining Institute on recent developments in connection with hydraulic mining in the Cariboo district of British Columbia.

Dr. J. A. Holmes delivered the address to the graduating class of the Michigan College of Mines on the occasion of their class day exercises, April 24th.

D. C. Jackling will change his residence from Salt Lake City, Utah, to San Francisco, Cal.

Waldemar Lindgren has returned to Boston, having finished an examination of mines at Zimapan in the state of Hidalgo, Mexico.

S. F. Shaw was obliged to leave Charcas, Mexico, on account of disturbed conditions there. Recent reports state that Mr. Shaw is back at Charcas and work has been resumed, though with a reduced force. Mr. Shaw and his British and American associates received the thanks of the State Department at Washington for taking a locomotive and cars and rescuing 15 people penned in a church at Charcas by rebels, and protected by a priest.

Douglas Waterman was married to Miss Mary Page Dutton on March 22.

H. V. Winchell sailed on March 22 for Argentina, where he will be engaged for about two months.

Louis A. Wright was married on April 2 at Newburgh, N. Y., to Miss Ella Birdsall.

Pope Yeatman sailed on March 19 for South America, where he will visit the properties of the Braden Copper Co., and of the Chile Exploration Co. at Chuquicamata. He will return to New York in July.

N. H. Darton recently gave two lectures on applied geology to the advanced geological students at Columbia University. The subjects were "The Geological Structure of the Northern Anthracite Field, as Determined by Deep Boring and by Mining" and "Construction of Maps showing Artesian Water Conditions." Mr. Darton's bulletin on "Sand Available for Filling Mine Workings" was recently published by the U. S. Bureau of Mines.

John T. Fuller, who has been superintendent of mines for the Canadian Copper Co., at Copper Cliff, Ont., has resigned that position.

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ANNOUNCEMENTS.

Report of Committee on Mining Law.—In this issue is published a number of communications received by the committee on mining law in reply to its letter asking opinions of the members of the Society and also of others. Owing to lack of space, only a portion of the total number can be reproduced in this issue; the remainder will be published in subsequent bulletins.

San Francisco Section.—Regular meetings of the San Francisco section will be held on the first Monday of September and December, 1913. Other meetings may be held on call of the chairman.

Bound Volumes.—Bound volumes of the bulletin of the Society for 1912 may be obtained from the Secretary for the price of $1.50. Any member desiring a complete set of the bulletins for 1912 unbound can obtain it, free of charge, by application to the Secretary. Volume IV (1911) may be obtained at the same price, but no complete sets of bulletins published prior to 1911 are now available.

Erratum.—The attention of the Secretary has been called to an error in the second paragraph of Professor Peele's address before the New York section on page 95 of bulletin No. 59, the eighth line having no connection with the remainder of the text. The Secretary has gone over the original report of this address and finds that this line was inserted by error of the printer, and should therefore be disregarded.

W. R. INGALLS, *Secretary.*

MINUTES OF MEETINGS

NEW YORK.

The May meeting of the New York section was held after an informal dinner at the Chemists' Club on Thursday, May 15, at 8.15 p. m. The meeting was called to order by the chairman, Mr. Stone. Those present were: L. S. Austin, S. H. Ball, J. V. N. Dorr, N. V. Hansell, L. D. Huntoon, A. H. Elliott, S. J. Jennings, J. F. Kemp, Charles P. Berkey, J. V. Lewis, H. S. Munroe, O. B. Oliver, R. Peele, G. Rigg, G. C. Stone, and W. Y. Westervelt.

The Chairman.—The minutes of the previous meeting having been published, unless there is some objection they will stand approved as printed. (A slight correction offered by R. Peele is noted elsewhere in this Bulletin.—Secretary.)

I will ask Mr. Rigg to tell us about his investigation of certain rock sections, with Lumiere photographs, which he has made, and to show us some of his plates,

Gilbert Rigg.—This work in color photography, in connection with these slides, grew out of an attempt on our part to make the laboratory more useful to the mill man and the furnace man. An assay, or even a complete analysis, is not very much of a guide other than to show what can and cannot be expected. For a great many years I have taken interest in this sort of work, but the difficulty has been to bring the microscope close to the man who is doing the work. When you get him in the laboratory you can easily convince him, but the ordinary plain photographs, which are no more than a matter of light and shadow, are nowhere near so convincing nor striking. Having several different minerals to photograph, the only way they would ordinarily appear would be by light and darkness, and attempts to show up the different gangue minerals are not successful when ordinary photographs are made. It occurred to me that possibly we might be able to do something in color photography. The first results were not very encouraging. The technique is not difficult, but it takes a little experimenting and study to obtain results which are of value. We are beginning now to get photographs which are really helpful.

[Following this introduction, Mr. Rigg exhibited many slides of rock sections, slags, and furnace linings, which were most interesting and instructive and showed the great value which Lumiere photographs have over the ordinary microscopic photographs.—Secretary.]

S. J. Jennings.—I would like to ask Mr. Rigg to tell us something about the technique of making these plates.

Mr. Rigg.—The technique is not difficult. The principal thing it calls for is judgment regarding the exposure. The method of slicing and mounting the specimen is well known. Using ordinary light, you have to be guided by the density of your exposure. In the beginning we made a mistake which required several weeks to correct. We followed the advice of a friend who had used sunlight, whereas we were using arc-lights. At present we are using an arc-light.

The Lumiere plate is of glass. On it, by some process which is a secret, a layer of minute red, blue, and yellow stained starch grains, one grain deep, is deposited; over this is the usual silver film. You expose the glass side to the image and the light filters through the starch grains. The red light, for example, will penetrate only the red starch grains and will affect the silver. Where there is no red grain the silver remains unaffected. On developing and fixing its plate, the glass behind the red grains will be left clear, so that it will appear red when held up to the light. Similarly with the grains of the other colors. As regards exposure, 10 to 30 seconds are required in ordinary light or microscopic light. With polarized light, it is largely a matter of trial; I should say that from 1 to 1½ min. is required. It usually takes three plates to get one good one.

Dr. A. H. Elliott.—Do you use an alum cell?

Mr. Rigg.—The field we use is yellow glass. Some of our results are very disappointing, due, I think, to the yellow glass. We shall use a green glass next time, so as to get more of the green.

Dr. A. H. Elliott.—How do you prevent the field from getting too hot?

Mr. R. Rigg.—We use a plain mirror instead of a concave mirror.

S. J. Jennings.—Do you think from the photographs you would be able to judge to what degree of fineness you would have to crush a given ore?

Mr. Rigg.—I think so, but, of course, not from a single specimen.

W. Y. Westervelt.—The object of this work is to accentuate the different colors of the various minerals, under polarized light?

Mr. Rigg.—The distinction of minerals is easy for a man who is using the microscope, but it is difficult to make a mill man, without the microscope, familiar with the different minerals by the use of ordinary photographs.

Member.—Is there no way of reproducing these prints on paper so as to preserve them?

Mr. Rigg.—The next issue of Scribner's will contain some prints made from photographs taken at the Panama canal.

G. C. Stone.—If these plates are kept in the sunlight, they fade.

At this point the members were invited to inspect the plates at close range, and the rest of the meeting was occupied in informal discussion among the members.

The meeting adjourned at 10 p. m.

L. D. HUNTOON,
Secretary of Section.

COMMUNICATIONS

Accompanying the report of the committee on mining law, which was published in bulletin No. 59, was a file of correspondence received by the committee in reply to a circular letter issued by it. This letter, which was sent to all members of the Society, and to many other persons whose opinions it was thought desirable to ascertain, was as follows:

The Committee on Mining Law of the Mining and Metallurgical Society of America has decided, after consideration of the subject, to attempt to gain an expression of opinion from the members of the society and from others whose interests and experience qualify them to speak upon some of the main questions involved. That there should be a general revision is admitted on all hands; that it will come in time is certain; and that it is likely to be soon may be judged from the wide attention now being given to the subject. Such revision has been urged by committees of mining congresses and public organizations of various kinds; it has been recommended by the Director of the United States Geological Survey, by Secretaries of the Interior and in Presidential messages. Special committees of the Congress have had the matter under advisement; and in many parts of the country the general inadequacy and many absurdities of our present system have become so irksome as to create a widespread demand for an entire new law. The old law has been so construed, amended and revised by judicial interpretation that it has become almost impossible for the courts themselves to decide what it really means; and no two lawyers agree on all important points. In many districts, mining companies have entered into agreements for the purpose of escaping from the litigation which is almost inevitable under the present law; and there is thus a lack of uniformity in actual practice throughout the West.

With the possibility of an attempt at such revision along lines that may work injustice and injury to existing titles, it is a matter of the greatest moment to all mining engineers and others interested in mineral lands, that any statutes proposed for enactment shall be those best calculated to encourage development of our resources, and at the same time wisely and truly to conserve and prolong our mineral industry and protect property rights already acquired in good faith under present statutes. It must be our business to see to it that no unwise experiments are tried in the field of legislation, but that the best brains of the profession shall give to the framing of a new law that careful study and broad consideration which are justified and demanded by its importance.

It is quite possible that the average owner of patented lands may not realize the extent to which even his interests may be affected in case of the passage of legislation that has been already suggested by the believers in extreme conservation measures and in the sovereign rights of the Federal government. It may be somewhat of a shock to him to learn that it is seriously maintained by some that "the government of the United States has never waived its right to the precious metals"; and that "in states where the ownership of the land has been vested in the Federal government the ownership of the precious metals lies with the nation, and that as against the government no person has a right to the gold and silver in any lands in the United States, unless this right has been specifically granted to him in the deed of conveyance."

Indeed, this same theory is even extended to all minerals, and in some of the English colonies the government has resumed jurisdiction over patented lands and the minerals contained therein, and has declared them open to exploitation by others if their owner does not himself take out a permit or a lease to explore and mine. In a similar way it is maintained that the government of the United States "might with considerable justice claim all mineral in all lands alienated under the agricultural land laws since the development of the government policy in the fifties and sixties, which required the reservation of all mines and mineral lands to the government." And it is said that "a legislative assertion on the part of the government of its right to all minerals in agricultural alienations since that time would give to every man what he swore he was getting, but no more. It would further have the effect of automatically cleaning the record of all land frauds involving mineral values." (Quotations are from Reports on Mining Laws of Australia and New Zealand by Special Commissioner A. C. Veatch, Washington, 1910.)

In view of the possibility of the enactment of even such revolutionary and radical legislation it is a matter of the greatest importance for us to have before us the views of those of our profession who have studied this subject abroad as well as at home, and who are perhaps able to distinguish clearly the fundamental and vital principles which constitute the basis of our American law and upon it build a consistent, harmonious and modern structure.

With this end in view the committee requests as prompt a reply as possible to this communication. It invites suggestions and discussions of general nature as well as upon single and special matters. To the following questions we particularly desire answers and arguments as fully or as briefly as the writer chooses, in order that the skeleton of a bill may be prepared upon which there may be some unanimity of opinion. The questions are as follows:

1. Classification of lands and segregation by the government of all minerals from surface rights.
2. Nature of the possessory right. How should mining rights be initiated? How should they be perpetuated, and how terminated?
3. Shall mineral lands be permanently alienated or leased? Do you advocate different provisions for the precious metals or shall coal, iron ore, petroleum and other minerals be treated alike?
4. If the present system of alienation of title is retained, shall we still keep the extralateral right principle?

Your committee already has decided views upon many of these questions, but wishes to frame a bill which will meet with the support of the majority of our members. Suggestions will be welcomed on any phases of the subject, even though they are not covered by the questions here propounded. It is the desire of the committee that no publication be made of this and others of its communications until some report is prepared and submitted for consideration and amendment.

Yours very truly,
H. V. WINCHELL, *Chairman.*
C. W. GOODALE,
M. L. REQUA,
Committee on Mining Law.

Minneapolis, Minn.
Nov. 27, 1911.

Some of the replies received by the committee are as follows:

George J. Bancroft (Denver, Colo.).—(1) I think the Government should classify the lands and then stand by its own classifications. To illustrate this I will mention an example: A man took up a claim in a mining county and situated within a mineral district. The Government maintained that the land was non-mineral and contested his claim. He then asked to file on it under an agricultural claim and was informed that the land was not agricultural in character. He then offered to take it under the timber and stone act and was informed that the act was obsolete because the land was in a forest reserve. In other words, the Government maintained that this particular piece of land was not subject to any entry whatever. The Forestry Bureau did not claim that the ground had any timber value.

Another instance: A man took up a homestead in Routt County a good many years ago. His application was accepted and he was allowed to live on the ground for a matter of ten years. He then proved up and acquired a title. Several years afterward suit was brought to annul his title because the geologists claimed that there was coal under his land at a depth of about 1,000 feet.

The Government has facilities for classifying land superior to those of any private individual, and I think it should state what a certain tract of land is, and then have no recourse if, after a man takes it up under the Government classification, it turns out to be more valuable for some other purpose. I do not approve of the segregation of surface from mineral rights for the reason that it produces confusion of ownership. I can see, however, that in some instances it is a desirable procedure. If segregation of surface rights becomes a law it should work both ways, that is, a man should be entitled to take the surface and not the mineral, or take the mineral and not the surface, or take them together.

(2) Mining rights should be initiated and terminated much in the same manner as heretofore. I think no changes are necessary. Some critcism has been made of the assessment law, it being alleged that assessments are often done in such a manner as to be of no benefit to the mine or country. This, as you know, is often the case. However, I cannot think of any more intelligent manner of handling the matter than the present one. Additional governmental supervision would be extremely costly and would result simply in friction.

(3) Mineral lands should be owned in fee-simple by the people. I have operated in Mexico and British Columbia. Advocates of the plan of government leases mention those two countries as examples of the beneficial operation of the leasing system. As a matter of fact the so-called British Columbia or the Mexico lease

is practically the same as the United States patent, except that there is no redemption after a sale for taxes. Our mountain counties have bid in a great deal of mining ground for taxes, and the county officials will tell you that the redemption law is a benefit rather than a hindrance to the mining industry.

The kind of lease that I have heard proposed for the United States is radically different from the so-called lease of Mexico and British Columbia. It is proposed to involve governmental supervision and active control of operations. Such a system would be a great hindrance to mining industry and a great expense to the nation as a whole; furthermore, there is no real reason for any such law. The mining people are satisfied with fee-simple title, and those who clamor for a change are sentimentalists who do not understand the business.

It has been said that many mines are now worked by lessees who take their lease from individuals; hence there can be no objection to taking a lease from the government. This argument is wrong, because the essential fact is overlooked that a private lessor always contributes somewhat to the aid and encouragement of the lessee. Generally he provides equipment, and some development with it. If he does nothing more, he pays county taxes and provides county roads and schools for the lessees. Moreover, a private lease is a very flexible instrument. In case of bad luck it is always possible to have the lease modified to suit new conditions. A government lease would be inflexible and the government would do nothing to encourage industry, if we may judge from the forest reserve, which is the first step toward government control of the public domain.

(4) I think the extralateral right principle should be done away with. In fact, the only changes that I think are demanded at the present time are classification of the lands and the abolishment of the extralateral right. I will not attempt to outline the safeguards to existing titles which should surround the change from extralateral rights to vertical boundary rights, but I have discussed the matter with experienced mining lawyers and I find that every conceivable contingency can be covered by a vertical boundary law.

Robert N. Bell (State Mine Inspector, Boise, Idaho).—(1) Surface rights should be carried with the underground mineral resources in the principal metallic mineral deposits, but might be segregated in the non-metallic deposits.

(2) I think it would be a good idea to have possessory rights in recognized metallic districts established regardless of any surface showing in areas to be determined in advance by law, and carried by

either the performance of $100 worth of annual assessment work or by the payment to the government of $100 in cash for a period of five years, after which they should be relinquished or patented.

(3) In view of the excessive price the past administration advocated for coal lands, a reasonable leasing system would be much more advantageous than an outright purchase, but I would advocate a different method for the precious and more useful metallic minerals, except iron, from that applied to non-metallic minerals like petroleum, coal, phosphate rock, etc.

(4) I would advocate the abolition of the abortive extralateral right principle for all future mineral locations. The planes should be vertical and boundaries absolute. The size of lode claims should be based on the same generous consideration as the placer claim is at present, and the five-year working or leasing claim should be permitted.

Eliot Blackwelder (University of Wisconsin, Madison, Wis.). —(1) From several years' acquaintance with the Rocky Mountain coal and phosphate lands I have been led to believe in the advisability of separating surface rights from mineral rights on government lands. Mining differs so completely from farming or stock raising that the two pursuits cannot be carried on to advantage by the same parties. Therefore, there seems to be no valid reason why a man who buys a farm or a sheep ranch should be allowed to own the deposits of coal or metals which may underlie it. Another point is that if the two types of rights are segregated, the government will be able to reserve certain mineral deposits for future use without withholding any farm land from development, and will also be able to make entirely distinct regulations for the purchase, leasing or management of mineral deposits as distinct from agricultural lands.

(3) I am disposed to favor the leasing of mineral rights on government lands. This should tend to prevent monopolistic control, would leave the actual ownership in the hands of the people until the distant future when conditions may be quite unlike anything which we can now foresee, and it would permit the government to exercise some control over the methods of mining. Of course, the corrollary to this is that the government must adopt a wise policy and see to it that its regulations are carried out efficiently and justly. Some people, no doubt, will be skeptical as to this last feature.

Perhaps a set of provisions could be devised which would work well for all types of mineral deposits, but on the whole it seems to me that it would be better to recognize the inherent difference between deposits which underlie relatively large areas, and are more or less uniform in character, and those which are comparatively small in extent, and variable. In the first group I should put such sedimentary deposits as coal, certain iron ores, rock phosphate, salt, gypsum, building stones, cement and other bedded deposits. In the second group would belong particularly the true vein deposits and the pocket-like orebodies characteristic of most metals.

(4) As to the extralateral rights principle, it seems to me inherently bad. In view of the difficulty of tracing many geological structures underground, and the still greater difficulty of predicting them in advance of actual mine work, I cannot see how this principle can fail to be a fruitful source of dispute and litigation in all but the simplest districts. It seems to me clear that some system should be adopted which would determine in advance the exact limits of each man's property in all dimensions.

Emmet D. Boyle (Virginia City, Nev.).—I am in favor of certain amendments to the law of 1872, more for the purpose of accurately defining its provisions than with the idea of making radical changes in the present manner of acquiring title to mineral lands.

(1) It appears to me possible at this time to formulate a pretty positive set of regulations governing the classification of lands. I would prefer to see this classification made by the United States Geological Survey, and all lands offering the slightest inducement to mineral entry withdrawn from entry of any other form, but I do not think that the segregation of minerals from surface rights can have other than an unsatisfactory operation in practice. The deed from the Government in every case should be without reservations. The present system of proving the non-mineral character of land by the certificate of the applicant, is, however, farcical, and non-mineral entries should be passed upon by Federal authorities.

(2) I see nothing radically wrong with the present system of obtaining possessory title. The provision requiring annual labor appears to me better than the Mexican system of an annual tax. I believe, however, that the locator of a mining claim should be required to locate his boundaries within a year with practically the same accuracy required in describing the ground in the application for patent, and that the costs of this should be accepted in lieu of holding work for the first year. I have also thought that mining claims, being in the nature of a Federal grant, should be filed for record in the office of the Surveyor General, subject to the cancellation for failure to provide adequate descriptions and sufficient proof of labor to the same authority when due.

(3) I am in favor of the permanent alienation of lands. I believe that the non-metallic minerals should, owing to their different modes of occurrence, be acquired under different regulations than those governing the acquisition of title to the metalliferous ores. The Statutes should, however, define within close limits the procedure in each case and thus eliminate the difficulties arising from the free and easy interpretations heretofore made by the Land Department and the Courts.

(4) I am in favor of retaining the extralateral right principle as applied to lodes or veins, but the statute should attempt to define a lode or vein in contradistinction to deposits to which this principle cannot apply.

Juan Felix Brandes.—Broadly speaking, it seems to me that if the Government sells any land whatsoever, it should convey with it everything that is in it or on it; on the other hand, the Government, as other governments do, might in special cases retain title to the surface and what is on it, but lease or sell the mineral rights, and vice versa.

I am not in favor of the present method of obtaining patent to mining claims. Sufficient time should be given the prospectors, after filing their locations, to survey and prove the ground, and a title should be granted within a reasonable time, upon payment of a fixed tax. I do not believe in the compulsory and nonsensical digging of ten-foot holes. It is a waste of money and accomplishes nothing. Title to be forfeited and to revert to the Government upon non-payment of the annual tax, a certain time to be allowed for grace; and forfeited titles of locations to be advertised by the government and become open for re-location.

Coal, iron ore, petroleum, etc., and other deposits and mineral formations should be treated alike. The apex law should be discarded and boundaries made vertical.

R. W. Brightstocke, (Drummond Mines, Cobalt, Ont.).—(1) In regard to the classification and segregation of lands I think that a distinct separation should be made between mining rights and surface rights. I would strenuously oppose any government's giving away to the settler both surface and mining rights. Long ago, in Ontario, this was done; the mining rights in a great many cases have been transferred by the early settler to others, who have since disappeared; all trace of them has been lost, and there are today promising prospects in Ontario to which it is impossible to obtain title. This has now gone on for such a long time that the Government has instituted a tax of 2c an acre on patented claims in order to force the owners to come forward, if they exist; if the taxes are not paid within a certain time, the mineral rights revert to the Crown.

(2) Mining rights should be initiated by obtaining a permit or license from the Government; this should be perpetuated by the annual purchase of a permit, by performing so much work per acre, and should be terminated by refusal to comply with such regulations as the Government would set forth.

(3) It should be possible to acquire mineral lands for 99 years only. I would advocate different provisions for the precious metals, as distinct from coal or iron ore, petroleum, gas, etc.

(4) I never had any sympathy for the extralateral rights principle on account of the difficulties in regard to settlement, of which we have had ample records.

R. B. Brinsmade.—(1) Surface and mineral rights should always be separate except where the removal of mineral would ruin the surface for other purposes, as in case of some building stones, clays, etc. I agree with A. C. Veatch that we should follow the example of the English colonies and restore to the state all mineral rights not specifically deeded away to individuals.

(2) Possessory right to mineral claims should be obtained, as now, by denouncement, survey and registration. Tenure of right to depend in doing, as now, a specified amount of development work annually, but this work should be officially inspected and not depend on a mere affidavit, as now. Unless strict inspection can be insured it were better to require an acreage tax instead of assessment work, as in Mexico, but unlike Mexico this acreage tax should be uniform for small and large claims. Failure to do assessment work or pay acreage tax should throw a claim open to denouncement by others; previous claimant to have right to remove improvements.

(3) Mineral lands ought never to be alienated but only leased, subject to a royalty based, not on gross output, but on net value of mineral in the ground. Metallic claims should be less in size but have a higher acreage than coal or petroleum claims.

(4) Extralateral rights should be abolished.

The above answers are based on mining experience in the United States, Canada, Mexico and Argentina, and also on an extensive study of political economy and sociology. The private appropriation of true land rent is a heritage from feudalism and has not even its fairness, for the feudal lords, at least, used most of their land rents for the support of government. At present in the United States, less than one-fourth of the taxes (local plus national) are collected from true land rent, and consequently we find the mass of consumers impoverished in order to create a few thousand millionaires, while the competitive struggle is made unduly hard for the great middle class. Also, speculation is made more profitable than work, and would-be producers are obstructed by forestallers.

A patent practically makes a feudal lord of the mine-owner, with even state officials allowed in the mine only by courtesy. Thus the results that most of the funds spent for geological surveys, etc., simply increase land values and do the general population little good. The spectacle at Joplin, on the Mesabi range, etc., of land owners draining immense royalties from lands worked by others is a parody in democracy and inexplicable from the standpoint of a moral industry, whose rewards should be based on equivalent service. A permanent democracy, means equality of opportunity and that necessitates the social appropriation of true rent.

R. W. Brock (Director, Geological Survey of Canada, Ottawa).—(1) In my opinion, mineral rights should be separated altogether from surface rights. This renders the classification of land unnecessary.

(2 and 3) I am in favor of the leasing system, the term and conditions of lease being made liberal. This does away with any possible obscurity in the title; one always knows that the mineral rights are not held, that they belong to the public domain, and that when abandoned or forfeited they revert automatically to the public domain. The mining rights should be acquired by staking, and applying for them. They should be held as long as a person really desires them for *bona fide* operations. They should revert to the public domain when the holder has no further interest, or only a speculative interest, in these rights. This can be accomplished by annual rental and, where necessary, by working conditions. I think there should be different provisions for coal, petroleum, placers and ores.

(4) I do not think the extralateral rights principle should be retained. It was tried in Canada and was abandoned. There is practically no difference of opinion regarding the wisdom of the change.

Alexander Burrell (Chouteau, Mont.).—I am in favor of eliminating the absurd practice of attempting to dispose of dips, spurs and angles for mining claims. There should be no extralateral rights. The locator should be permitted to locate a square of ground for all mineral grants, be it coal, oil, or other minerals, and the original discoverer should be granted several squares as a reward, if applied for at the time of discovery. That is, he should file some sort of document at the place nearest or most convenient, at the same time leaving some evidence of his presence on the ground. Thus he should be protected if his claim is established as discoverer of the territory.

I am opposed to royalties. I believe all governments should respect the rights of the owner of the surface to all its contents, after they have surveyed and properly inspected the land. Should this survey and inspection justify withholding any part of this, pending a more rigid examination, allow it to be done, but do not allow it to be delayed. Avoid the possibility of the "dog in the manger" policy. There should be a condemnation right to enter the same as any private or corporate right may now be acquired for public utilities. This right should be carefully framed to avoid any possible attempt at fraud.

Perpetuity is an important feature, and yet the proviso supplied in the right to condemn and to enter in should eliminate the risk of large corporations holding important areas to the detriment of the many, thus preventing an owner from making the proper use of his holding.

I believe that the owner of the surface should be regarded as the owner of everything beneath the surface. In my own experience, the right has often been granted by owners of the land to prospectors, who were properly equipped, to go into their lands, under some understood plan. This individual arrangement has had much to do with the thorough development of any country. Any laws that will encourage this will be beneficial.

Government agents do not usually discover or develop anything, and in order to encourage settlement, and to extend the principle of the greatest good to the greatest number, some such law as the above should be enforced. There can be no hardship or injury should the settler find valuable deposits on his land, for the reasonable conclusion would be that he would lease, or sell the right to others, and in a way that would materially benefit the community. This is an old system which has been enjoyed by the older states of the East. The system of Crown ownership was found to be harmful in the most enlightened countries of the Old World, and it ill becomes our country to turn backward.

George E. Collins (Denver, Colo.).—To begin with, may I say that I disagree with your statement that "the old law has been so construed, amended and revised by judicial interpretation that it has become almost impossible for the Courts themselves to decide what it really means; and no two lawyers agree on all important points." I have discussed questions concerning the mining law with many of our most eminent Western lawyers, and find them unanimous in asserting that, so far as the deposits of metal-bearing ores are concerned (on which the Courts have had most opportunities to pass), the Court decisions have now created a coherent and intelligible system of law, which can be applied to the vast majority of actual cases. Most of the litigation concerning such deposits nowadays arises from differences as to matters of fact. Nevertheless, the condition that so much litigation still exists, whether it be due to differences of fact or of law, is a strong, and, to me, a convincing argument in favor of a change, if it can be effected without creating worse confusion and undue injury to established rights.

Speaking generally, my experience leads me to the conclusion that the Latin basis of law for mines is preferable to the Anglo-Saxon, and the leasing system to that which involves permanent alienation. Any change to leasing, however, in common fairness to existing owners, should be prepared by a formal affirmation of present titles.

(1) Lands should be classified by the United States Geological Survey, as soon as possible, into "mineral" and "non-mineral." No segregation of the mineral rights from surface rights should be made. There is no need to reserve the surface rights in the case of mineral land, as the latter would not be permanently alienated, and such reservations would merely create unnecessary restrictions on its temporary use. As to non-mineral lands, they are intended to be permanently alienated, and it is better and simpler to grant a title which shall not be encumbered with any reservation of mineral rights. The object of leasing mineral lands should not be to protect the property rights or revenues of the government, but rather to ensure the discovery and working of minerals. But for this, I should favor the permanent alienation of minerals also.

(2) Possessory right for mineral lands should be initiated by location, with or without actual discovery. They should be perpetuated by occupation, subject to a labor clause, and a small royalty on output, and terminated by failure to comply with the requirement as to operating or to pay royalty.

(3) All mineral lands should be leased only. The provisions for precious metals, common metals, coal, iron ore, petroleum, etc., might be identical, excepting as to the areas to be included in each leasing unit. This, for metal mines, should be small; for coal and petroleum lands, quite large. In each case

corporate or associate ownership of several contiguous units should be encouraged, and facilities given for the clubbing of the annual labor requirements. Claims should be wider than at present, and preferably square.

(4) The extralateral rights principle should be abolished, excepting in areas where it exists already. In other words, mining districts established under the apex law should remain subject to it. They have presumably fought out most of their legal battles already, and to endeavor to maintain the two systems side by side would result in inextricable confusion, both in the courts and in the public mind. It is of course impossible to confiscate vested rights; but if we were able to establish vertical-boundary property rights in the midst of a mining district previously covered closely by apex-right claims, court decisions based on the former would gradually but inevitably tend to modify both judicial and popular conceptions as to the latter, and in a community such as ours, in which popular opinion is the sole ultimate sanction of any law, would ultimately result in the partial or total confiscation of the rights which now result from ownership of the apex.

Moreover, any disturbance of the apex-right law in an existing thickly located district, where ownership of mining claims is widely distributed, would create such a stir that the proposed changes would be rendered impossible by public feeling. Provision should, of course, be made for the adoption of vertical boundaries where mutual agreement among existing property owners renders it applicable.

Colorado contains a very large number of small mines, and a still larger number of "prospects," and a large proportion of the population in the mining districts are owners of property in a small way. Whilst a great majority of professional engineers, and probably a majority of large mine operators, favor vertical boundaries, I am convinced that an overwhelming majority of those who own mining claims are strong adherents of the apex-right, and this fact should be borne in mind in any attempt which may be made to introduce vertical boundaries, for if it is not taken into account I doubt whether any change will be possible.

I believe that any addition or amendment to the mining law (and some new legislation is imperative, if only to provide means of taking up and working coal, oil and phosphate lands) should include provisions for abolishing the present discovery requirement, and for the compulsory survey and recording of locations within a reasonable time. Moreover, as the Courts properly hold that when original monuments and survey notes disagree the former should prevail, it is only reasonable to insist that monuments should be both conspicuous and permanent. In some of our mining districts to-day they are neither.

W. L. Cumings (Bethlehem, Pa.).—(1) I believe that in the future, when lands are obtained from the Government by any parties, the title to the mineral should remain with the Government, subject to a separate denunciation either by the owner of the surface or by others, if mineral is discovered by other than the surface owner.

(2) All conditions under this heading should be settled by as close an application of the Spanish law as possible, and preferably the Mexican practice.

(3) Permanently alienated, but subject to become again the property of government if taxes are not paid, exactly as in Mexico. I believe a classification is necessary to force the different minerals in their proper place, but do not think the Mexican law or the old Spanish law is to be followed in this respect. However, it should serve as a guide.

(4) No extralateral rights in any case should be sanctioned by law.

Thomas L. Darby (Los Angeles, Cal.).—(1) If it is done intelligently and by really capable people, it is best to classify all government lands and to sell them absolutely under such classification. By reserving the minerals to the Government it will never be possible to give an absolute title. Until the Government has careful and intelligent classifications made by experienced geologists and engineers, it is not possible for the majority of people to tell whether or not, at great depths, land may contain such products as coal, oil, gas, etc., and it will operate a great injustice for the Government blindly to claim all minerals. I am in favor of the Government's making careful classification of all the lands it now owns, but I am absolutely opposed to the Government's reserving and retaining all or any mineral rights. It is far better to let someone get absolute title to the lands under a proper classification.

(2) I have always favored the principle that a possessory right to mineral lands should be based upon an actual discovery of mineral in place. It is absolutely wrong for prospectors to locate large areas without making any discoveries and to hold them by force. There should be a limit to the length a discoverer can locate upon any one vein (say 3000 ft.). The width of a claim should be not less than 400 nor more than 600 ft., accord-

ing to the dip of the vein (600 ft. if less than 65 degrees from horizontal). The discovery shaft to be located anywhere on the claim, even at a side line, with no extralateral rights; the side and end lines to extend down vertically. This would compel locators to do enough work upon the vein to determine its dip. At a first glance this might appear to be a hardship on the prospector, but something must be done to prevent one or two prospectors from locating 20 to 40 claims in one district, which they are unable to develop; and about the only way to prevent it is to compel them to do enough development work upon any vein they may locate to determine its strike and dip, before they can have it surveyed and recorded.

Coal, oil, phosphate, salt, soda, borax, nitrate and such lands should not be sold under the same law as lands containing the precious metals. There should be a distinct law as to them, with requirements as to development which would be consistent with the character of the land. With such lands as these I can see no objection to allowing a possessory right to reasonable sized tracts for as much as one year, in which to make a discovery, providing actual work is begun within 60 days and continued diligently until such discovery is made. As soon as the required expenditure has been made and an application filed in the usual manner, patent should issue.

In the case of precious-metal mines the existing law as to $100 annual assessments is perhaps as good as any, for the perpetuation of title, until patent is issued.

(3) I am absolutely opposed to the permanent or even temporary leasing of land by the Government. After the lands have been properly classified, let someone get an absolute title to the lands.

(4) The extralateral rights principle should not be continued in any future locations of mineral lands.

In conclusion, I am opposed to any law which will reserve the minerals, hydrocarbons or salts to the Government. It would produce interminable trouble and confusion, in addition to vastly increasing a bureaucracy which in our form of government is liable to change in personnel and efficiency every four years.

Algernon Del Mar (Los Angeles, Cal.).—I believe there should be a division of the public lands into at least two classifications, first for the mining of the precious metals and the base metals, and second for the mining of any substance that can be considered as a public utility, as coal, petroleum, etc.

Mining for the precious and base metals, particularly the former, is such an uncertain business that the laws should be the most lenient possible to give encouragement to the miner and prospector. As the mining of lead, copper and zinc ores is so intimately connected with the mining of the precious metal ores, they should all be considered under the same general laws. All other substances, not connected with mining for the precious metals, should be considered as substances of public necessity. I will confine myself to the former class of claims, for I have little personal knowledge of the others.

All our Western country has been opened for settlement through the efforts of the miner, and there are large tracts of land still awaiting improvement and a market which can be fostered only by trade with mining communities. The business stability of the country depends upon the production of the precious metals, and the miner who risks his time and money in prospecting for these metals should be given every encouragement.

The Western miner does not like the word "lease" when applied to mining lands, and while, at present, lands are held by a lease from the Government, the word lease brings to mind some new set of conditions which reminds the citizen of the "old country," from whose laws many of them have been glad to escape. Better call the lease a limited patent.

I do not think the Government should give an unlimited patent to any mining claims of whatever description, for it is presumed that the land is valuable only for the mineral, whereas the patentee holds the lands against all comers whether they be farmers or miners. The country still needs individual initiative, which under Government ownership would be somewhat lacking. Leasing is apt to be mixed with politics, as exemplified by the Canadian Government's management of the Cobalt silver area.

I believe the number of claims that any individual or corportation representative may locate should be limited, and I suggest that not more than two claims be allowed to any individual in any one year in any one state, and that no locations be allowed by proxy. The individual must locate his own claim and for no one else, and the representative of a corporation shall have no more right than the individual, and the corporation shall have no right to locate mineral lands as a corporation.

The surface rights of precious-metal claims should not be alienated from the underground rights, but all other claims should be so alienated that the locator would be protected for a number of years, after which time the land would be thrown open for location for agricultural purposes. A precious-metal claim is usually located away from agricultural lands, and such lands have little value outside of the mineral found thereon, except perhaps for grazing purposes. If the surface rights were alienated in the case of a precious-metal mine, it would deprive the locator of the right to the timber on his claim, the means of disposing of his waste products, and the right to erect works for the reduction of his ores at and where the conditions were best suited.

The possessory right to precious-metal claims should be by locating, recording the location, and marking the claim by monuments. This possessory right should be allowed to continue only by working the claim as a commercial enterprise. Failure to do so within a period of five years after location, or abandonment as a working mine, should cause the claim to revert to the public domain. By this I do not mean that the assessment work, as required by law at present, would be sufficient to prove a commercial enterprise, but that the owner shall have erected a mill or reduction works, or shall have shipped at least a certain amount of ore to some reduction works besides doing his assessment work as required by law at present. The proof of non-abandonment shall be on the claim owner and not on the contestant as is usual, but the contestant shall deposit bonds to cover the expenses of the owner in presenting proof of the validity of his claim, should it be validated.

If the present system of alienation is continued, we should abolish the extralateral rights, and make all mining claims conform to the rectangular boundaries projected vertically downward; but no existing rights should be put in jeopardy.

The locator of a mining claim shall not be allowed the right of re-locating in any form whatsoever. When this claim has reverted to the public domain it shall be open to location to any one except the original locator, whether for himself or for some one else.

Summary.—1. Classification of mineral lands into "precious-metal claims," for the mining of the ores of gold, silver, lead, copper, zinc, and tin, and "public necessity claims" for the mining of all other substances.

2. No alienation of the surface rights from the mineral rights for precious-metal claims, but alienation in the case of all other claims.

3. No unlimited patents to be issued by the Government. A limited patent to be issued which will remain in force under the same conditions as a permanent patent if certain provisions are carried out.

4. Possessory right shall be by locating and working, as

set forth, and shall be terminated by failure to work after sufficient time has been given to start work, or by abandonment by failure to work.

5. There shall be no extralateral rights.
6. There shall be no right of re-location of mineral claims.
7. A limit shall be placed upon the number of claims a man may locate in any year in any one state.

Francis Drake.—Having had some experience with the mining laws in British dependencies, and knowing something of the abuses practised under the present United States mining law, I venture to give my views.

(1) I am in favor of reservation by the Government of all minerals to which the title has not already been alienated. Where land has been taken for agricultural purposes, and since been found to contain mineral, I would allow mineral locations to be made, either by the agricultural holder or others; always providing in the latter case that the original holder shall be suitably compensated for any damage which he shall sustain by the working of the minerals. The surface necessary for such working shall be granted to the miner on suitable compensation being guaranteed to the original holder.

I should not make any general classification of the public lands, but would make the areas liable to be taken up differ with the different minerals to be won. For instance, I should allow a much greater area for coal mining than for gold mining. Where more than one metal is recovered the one with the predominant value is to be considered the one mined for. Leases of smaller areas to have the rights of those of larger areas.

(2) All possession should be finally by lease from the Government. The initial right would be acquired by discovery and possession, the discoverer being allowed a certain short period in which to make application for his lease. The lease should be for a fixed term, with the right of renewal. The lease would automatically be forfeited if the holder did not comply with any of its covenants. The holder should pay a yearly rental in advance, the amount varying with the class of mineral to be won, the leases at the greater rentals giving the right to mine for minerals granted at a lesser rental. The lessee would have to agree to keep a certain number of men employed in working the property, the number of these to vary according to the class of mineral to be won; but the labor condition could be suspended on giving good reason therefor, at the local land office, where a ticket authorizing such suspension would be granted. Inaccessibility at certain seasons of the year, the exhaustion of

the holder's financial resources, the influx of water, would be good reasons for a temporary suspension of labor.

(3) Every effort should be made to do away with the extralateral rights principle. It is probably impracticable to interfere with existing rights, but no new ones should be granted. All boundaries should be vertical.

E. E. Ellis (Birmingham, Ala.).—(1) In case the classification of lands and the segregation by the Government of minerals from surface rights are adopted, I believe that such classification should be confined to certain types of bedded deposits, such as coal and phosphates. It would be a practical impossibility for officers of the Government to classify properly all mineral interests in land, such as precious metals, gas, petroleum, etc. Very few types of mineral deposits could be properly classified.

Questions 1, 2, 3 may all be answered, in my opinion, by the Government's adopting the policy of complete separation of surface and mineral interests. I believe that in all cases hereafter, the surface interests in land should be sold entirely separate from the mineral rights, but that in all cases, certain reservations should be made in order that any development of minerals need not be unnecessarily hampered by conflicting interests of owners of the surface. Such reservations would have to be very explicit and broad and should cover both the interest of the owners of surface and of the developer of the minerals. I believe that all the mineral interests should be reserved by the Government and should be handled by a system of leases. A very broad policy should be followed in these leases, and they should be made transferable, the size of the area leased being not unnecessarily restricted as has heretofore been the case in patented lands. I believe that the handling of these mineral interests should be so arranged that a prospector or developer would have the right of entry upon such sized tracts of land as might be desirable, by the payment of a nominal consideration, that he should then have six months to one year, depending upon conditions, in which to do such development as he might wish, during this interval having complete control of all rights under his claim and the privilege at the end of this period of taking up the claim under a proper lease from the Government. This lease agreement should carry a proper royalty charge for the minerals extracted, the minimum royalty being adjusted to circumstances as would be the case if the land were owned by an individual or corporation instead of by the Government. The royalty rate in all cases should be placed very low in order to encourage development.

The Government, in this manner, would receive a much greater revenue than it could under any other system, and there would be far greater incentive towards development of minerals than would be the case where large individual operators or corporations had control of immense blocks of territory. On the other hand, large corporations could not be prevented from conducting suitably sized operations if the lease transfer system and the plan of allowing large areas under single control were adopted. Under the arrangement of a lease and minimum royalty, such a concern would not care to have control of any larger block of land than it could actually operate to advantage. I believe that this system would work out to the advantage of both Government and operators, and that the chances of large profits to the latter would still be attractive enough not seriously to hinder development. I would advocate this policy for all government land not heretofore sold, and for all minerals from water to gold.

(4) If the present system of alienation of title is retained the system of vertical boundaries to claims should undoubtedly be adopted.

N. H. Emmons (Knoxville, Tenn.).—(1) Surface rights are different from mineral rights and should be treated differently for the following reasons:

The surface is used for the home of man while the mineral can be used only to produce wealth. The surface of the earth continues to yield its fruits forever if properly taken care of, while the mineral deposit is valuable only for a short time and when the mineral has been taken away the surface alone has value. The surface therefore should be deeded with a permanent title; the mineral deposit should be leased.

Classification of lands is not needed. If a mineral deposit is not sufficiently more valuable than the surface to warrant the purchase of the surface rights for their ultimate destruction, then the mineral deposit would not be worth exploiting. The mineral deposit being therefore more valuable than the surface, the searcher after mineral must be given the right to become the owner of such surface rights as are necessary to exploit his mineral deposit. This right should be obtained by purchase and a satisfactory method of arbitration to value it can easily be arrived at and fixed by law.

(2) The nature of the possessory mineral right should be a lease from the Government, the title passing to the lessor and being valuable only when the lease is paid yearly in advance.

The right should be initiated in a similar manner to that obtaining at present, in so far as the staking out of the claim and filing on it is concerned. The survey and preparation of the title should be done by the Government and its agents. The proving of mineral on the claim should not be a requisite to the perfecting of the title. As it should be the desire and aim of the Government to have its minerals developed, it should therefore make such regulations that the expense of securing the title be as small as possible. At the same time, the consideration for the lease should be so large that a just return would come from it both to pay for the perfecting of the title and to restrain the public from taking up large grants of land to hold and not exploit.

The mineral right should be perpetuated only for the time the lease is paid. As soon as there is a default of this payment the title should revert to the Government. The Government should advertise the facts of the termination of a lease the day such lease expires.

(3) If the lands are leased on a reasonable basis, there is no reason for making different provisions for different minerals. All mineral deposits should be treated alike. It is not the value of the mineral that makes the deposit valuable—it is the value of the deposit from a commercial standpoint. It is safe to say that a larger percentage of limestone deposits have proven valuable than of gold mines. No royalty per ton or other unit of measure should be charged Such royalty may be charged by the state in which the deposit occurs, and would be a tax. The leasing of a certain prescribed area of ground for a fixed sum of money, no matter what the mineral may be, should be the sum total of what the Government should receive.

(4) Under no condition should the extralateral rights principle be retained in any law of the United States. Compare the working of the extralateral right as carried out in Butte, with the side-line principle as it has been worked out by private agreement in Bisbee. Who has ever heard of law-suits over ownership of mineral on account of the side-line agreement in Bisbee, and who has not heard of law-suits over the same in Butte?

J. R. Finlay.—My ideas of the basic principles of a new law on mineral rights do not follow the specific questions asked. I shall attempt to answer to the general subject of the letter in a sequence of my own.

(A) The law should recognize the cession of mineral rights as having taken place in all fees heretofore granted by the Government in its sales of land.

(B) With lands still remaining in the possession of the Government, there should be no absolute cession of mineral rights; but the Government should adopt the policy of granting concessions, i. e., leases to mining companies or individuals with some reference to the needs of the situation. Gold and silver are not substances of fundamental economic importance, and there is no reason for any effort to conserve them. The policy of leasing lands for mining these metals should include a nominal royalty more for the purpose of securing publicity than for any other reason. Mining should be made as far as possible free from false impressions ingeniously handed out to the public in the guise of facts that are true enough but which do not convey full information. Other metals are more important, but the mining of copper, zinc and lead is so closely associated with that of gold and silver that it is not clear how they could be treated differently. It might be, however, that the Government should have the right to promote the mining of extensive low-grade deposits on a different basis of royalty and scale of operations. For instance it might recognize that to justify working at all it would be necessary for an enterprise to control several hundred acres, and it should discourage the holders of small tracts that might be leased merely with the purpose of blocking real operators until they were bought off.

In regard to iron, coal and other cheaper and more common products, the policy of the Government should recognize still more broadly the requirements of a profitable operation. Its leasing system should promote, so far as possible, uniformity of prices. It should discourage useless competition, which often destroys profits and renders conservation economically impossible. On the other hand, it should be, if possible, in a position to prevent extortionate prices. The size of the tracts to be worked in one concession would have a strong bearing on these requirements, particularly in the exploration of coal and petroleum, where frequently the really legitimate operator finds his business ruined by the useless competition of small operators who have no real chance for success.

The only chance the Government would have of applying these considerations intelligently and securing results of benefit to the public would be to create a high-class commission which would hold public hearings for the purpose of deciding on the disposal of any given district.

(C) The principle of granting extralateral rights should be abolished. A reasonable term of years should be reserved in which claimants of extralaterals on present claims could assert their rights. On the expiration of this term, claims that had not defined any extralaterals, or initiated suits to define them, would be confined within their surface areas.

(D) The system of granting innumerable overlapping and conflicting claims should be abolished. Claims should be made to conform with the Government survey. A discoverer should have some time to determine what description he wished for his claim. The likelihood of discovering new important districts on unsurveyed Government land is rapidly diminishing. In Alaska a simple scheme of surveying new districts should be adopted.

(E) The right to initiate leaseholds should be based upon the right of discovery. The right to examine the surface should be common. The right to explore the underground should be obtained through an option for a lease which might be renewed so long as work is carried on. These terms should be very liberal to prospectors for gold and silver, but not so liberal in the case of coal and petroleum.

Henry C. Ferguson (Hartford, Conn.).—My experience with mining law has been confined to the Philippine Islands, where a rather different system is in force.

The retention of title to minerals by the Government, except where the grant is distinctly for mining purposes, has worked well in the Philippines, and I can see no reason why it should not be equally satisfactory here, and have the advantage of doing away with the expense and uncertainties of the present system of land classification. In the Philippines no mining may be done on land held under homestead or other non-mining title, unless a mining claim is taken up.

I believe that it would tend towards better development of mining regions if possession of a mining claim should be made dependant on continuous development, or at least on the payment of a sufficient annual tax to make the holder "dig or get out." I believe that the Australian system of no freehold has been more satisfactory than our system of granting patents. Different provisions for different minerals seems to be the universal rule, but I cannot see any very good reason for it.

I believe there can be no question that the extralateral right has been a source of endless litigation and uncertainty, and that even if nothing more is done, its abolition would be a great step in advance. Under the Philippine mining laws no extralateral right is allowed, and consequently there have been practically no law-suits.

I believe it would be important, in any new measure, that no attempt be made to limit the number of claims held by any one person. Such limitation, supposedly in the interests of conervation, has been attempted in the Philippines, with the result that while that provision of the law has been generally evaded, its presence has proved very effective in scaring away capital.

Jno. C. Fleschhutz.—(1) My opinion is that when the Government gives title or patent to any parcel of its lands, the grantee should be entitled to everything within such bounds, as well as to what may be subsequently discovered beneath the surface. This of course applies to farming lands.

(2) The nature of possessory right should be determined by prior location and discovery. The discoverer of any mining claim to perform a certain amount of actual work the first year; for any succeeding years he should be taxed $10 per claim located. When an amount of work has been performed upon said claim equal to $500 he should be entitled to a patent from the Government.

(3) Mineral lands should be permanently alienated. All mineral claims should be made of like size and dimensions in every state, as far as it pertains to the precious metals. Coal, iron ore, petroleum and other minerals should be located in 100-acre tracts. A charge of $10 per acre for the precious minerals as well as for other mineral locations should be asked for by the Government when application for patent is made.

(4) The present system of alienation of title should by all means be retained; but hereafter upon all new locations no less than 600 x 1500 ft. in dimensions. The extralateral right should be discontinued.

Ernest Le Neve Foster (Denver, Colo.).—(1) Yes, with provision for use of surface held under other ownership. Mineral rights, whether known or unknown, should be exempt from all lands to which individual title is given by patent. Land valuable for mining purposes only should always have its title in the state or nation.

(2) The possessory right should be by concession of rectangular areas not exceeding 20 acres, conforming to section lines. A minimum amount of work should be required quarterly. Perpetuation of title should be by the payment of a minimum annual rental payable annually in advance.

(3) Leased on a minimum rental and a small royalty which should be sufficient to pay the expenses of the department, which could grant the concessions and collect the rents and royalties. Having had very little connection with the mining of iron, coal or the hydrocarbons, my opinion I do not consider of so great force regarding them, though in a general way

I see no reason why the plan I suggest is not good for all classes of deposits.

(4) I am utterly opposed to the extralateral rights principle, having been intimately connected with its working since 1872 and intimately mixed as an expert in a large amount of the litigation caused by it in the State of Colorado. Its effect to my mind is that it is a source of litigation, blackmail and quibbling, and often results in unfair verdicts by juries as well as paradoxical ones by different juries on the same evidence.

R. W. Hadden (Los Angeles, Cal.).—(1) I believe that all lands should be properly classified by the Government, and that title from the Government should cover only the claim made by the locator. In other words, if he make an agricultural claim he should be granted merely agricultural rights, leaving him free to make a mineral claim later, should his land be found to contain mineral. In the event of mineral being found on agricultural land, and the owner of that land not desiring to work the minerals, the Government should have the right to permit the working of them by any third party on payment of surface damages to the agricultural owner, such damages to be settled by a proper Government department.

(2) I believe that all mining rights should be by lease from the Government. They should be initiated as follows: Having found mineral, the locator should be permitted to apply for a prospecting right for a determined period, sufficient to enable him to satisfy himself as to the existence of mineral in commercial quantity. He should be able to determine this in, say, 90 days. I do not mean to say that within that time he shall be able to open up orebodies, but he should be able to decide as to whether the claim is likely to be worthy of development for a lease, and the terms of the lease should be that he proceed to develop in good faith, doing so much work in each six months. His rights should be perpetuated so long as he continues to do this stated work, and they should terminate on his failure to work his property for a certain stated period.

(3) This question is practically answered in the preceding paragraph. I believe that the Government should not alienate its rights. The Government is, in point of fact, so far as the public domain is concerned, a trustee whose duty it is to protect future generations, and the Government should exact a certain percentage of the profits to be derived from the working of the mines, because these really belong to all of the people, and in no other way can all of the people benefit from what is really their property. I do not advocate different provisions for the various classes of mineral.

(4) I do not believe in the extralateral right. It has been the cause of untold litigation, and has caused great hardships both to the original locator on an apex, and a bona fide locator of a claim bordering the side lines of the apex claim. I believe that the rights should be vertical within the boundaries of each claim. A locator can protect the extralateral rights at the time of his original location, should he be under the belief that the dip of his vein is likely to extend beyond the side lines of one claim.

One great advantage of the Government's perpetual ownership of mineral and the leasing system is that the locator is protected in his rights, and need have no fear of litigation. It would prevent overlapping of claims. It would provide a revenue to the Government, which it ought to have, and it would provide for the legitimate working of all mining property. At present the speculator may locate, and patent, and leave his neighbors to make his claims valuable. This would prevent the grabber from taking up more claims than he can legitimately work. It is not right that the speculator should be permitted to locate desirable claims, and hold them by merely doing the present annual assessment, which in the main generally consists of some ten feet of useless work. It would compel the owner of large tracts actually to work them, and in the case of coal lands would prevent the grabbing of all available coal measures by those who have no intention of working them, and whose sole object is to hold for an increased value.

Richard R. Hice (State Geologist of Pennsylvania).—(1) I favor the classification of public lands. This in view of the fact that conditions have changed from what they were in the past, and it is but right and equitable to all that lands should be disposed of with some reference to their value. Not, necessarily, meaning their value in the strict sense, but in view of having them developed with reasonable dispatch.

(2 and 3) I think these are closely connected. Believing that it will prove the best for all that a leasing system be inaugurated, the second question simply becomes "What should be the terms of the lease?" The experience with coal, iron ore, oil and other leases has been so uniformly good that the principle can well be applied to all classes of mining. Leases should provide that operations should begin within a limited time, that they should be continuously prosecuted at a rate commensurate with the size of the operation, and perhaps with the value of the mine. A lapse in the working for a considerable period should work a forfeiture of all rights, and I would make the term con-

tinue until the exhaustion of the land covered by the lease. Of course the details must be carefully worked out.

(4) If the surface included in any mining operation, however acquired, whether by lease or in fee, is limited as at present, the extralateral rights principle seems best. To preserve the present narrow claim means the development by a greater number of operators and, perhaps, of all the veins, which might not be the case if more surface were included within the boundaries of a claim. On the other hand, to abolish this principle and enlarge the boundaries of claims would greatly lessen litigation and disputes. Under a leasing system this could be regulated, granting under a lease the right to mine a certain vein, with sufficient surface to operate, but always reserving the right for the operation on other veins. When the matter of coal comes up, if the seams are anywhere near horizontal, it would seem that the operation should be confined to the surface included within the grant, whether by leasehold or otherwise. This applies to all operations which approximate the horizontal.

Richard C. Hills (Denver, Colo.).—Surface rights and mineral rights should go together to avoid the inevitable and vexatious questions of the amount of damages the miner shall pay for the necessary use of the surface in his operations; or, in the case of coal mining, the settling or sinking of the land, etc.

All mineral lands, other than those containing coal, gas or petroleum, should be carefully surveyed into 20-acre tracts, one of which should constitute a lode or placer location, whether of metals—including iron—or of building stone, marble, slate, phosphates or limestone; in fact, all mineral deposits except coal, gas, and petroleum. In all cases the bounding planes should be vertical.

To initiate a mineral right a discovery of mineral should not be a prerequisite, as in many localities there may be a heavy cover of detritus, or of rock in place, and considerable time and expense may be involved in reaching a zone that in the opinion of the prospector will contain mineral in paying quantities.

The initiation of a mineral right should begin by making a mineral declaration in the nearest land office. As soon thereafter as practicable a special agent or mineral inspector should examine the land to determine its mineral character. If the declaration is endorsed by the inspector the declarant should be required, beginning with the date of endorsement, to perform a certain amount of work annually, say to the value of $300, of which $100 shall be expended in the first four months. It would be the duty of the mineral inspector to ascertain by actual examination whether the requisite amount of work has been done. If not, the declarant's right should cease, and a notice to that effect be posted on the claim by the inspector, and the ground be open to location by others (though not by the original declarant or any relative or member of his family). In case of doubt as to the justice of the inspector's decision, the declarant might demand a hearing before the Land Office. The declarant should be allowed to enter his claim for patent, at a price fixed by law, at any time after the first inspection and endorsement. He should not be allowed to declare on more than two claims contiguously situated.

The acquisition of coal lands should be governed by an entirely different set of laws and regulations. Coal land, especially in the Rocky Mountain fields, is only to a limited extent agricultural land, and there is no sound reason for segregating the coal from the surface, much of the latter being required by the operator for towns, railways, coke ovens, washeries, aerial-tram dumps, water storage and other purposes.

Coal mine operations to-day, especially in the Rocky Mountains where the bulk of the government-owned coal land is situated, demands the expenditure of a large amount of capital, and small operators cannot afford the equipment necessary to render a mine reasonably safe, employ qualified inspectors, provide rescue cars and apparatus with trained crews, adequate hospital accommodations with trained nurses, the maintenance of proper sanitary conditions and comfortable homes, schools and means of recreation. When we reflect that a 1,500-ton mine, to have a life of 20 years, must have 2,000 acres of 5-ft. coal, and realize how difficult it is to obtain this acreage in one body, the reason why coal mine settlements in the West are called "camps," on account of the short life of the mines, is at once apparent. To establish permanent communities and enlist ample capital, an ample acreage is a prime requisite. When men are assured that they are promoting a permanent enterprise they build accordingly.

Just how this result is to be brought about is a serious problem. Indeed, the case seems hopeless viewed from the standpoint of the political agitator with his distorted conception of the "spirit of American institutions." From the standpoint of common sense, if one individual is entitled to purchase 160 acres of coal land, the bona fide stockholders in a limited corporation, none of whom has exercised his coal land right, should each be entitled to purchase 160 acres of coal land. A corporation organized for this purpose might be restricted to a maximum area of say eight sections (5,120 acres), requiring 32 stockholders, each the bona fide holder of not less than one sixty-fourth of the capital stock. This plan would make the entrymen the owners of not less than one-half the corporation stock, and would enable poor men to obtain adequate recompense for the use of their rights by men of capital.

As to the probability that such law would foster monopolies, it is only necessary to state that there is coal land enough in the Rocky Mountain states to furnish the maximum acreage for 50,000 such corporations, and if each one be limited to the maximum area the Sherman law will operate to prevent consolidation. It is only by combining individual claims that coal mine enterprises of any magnitude are rendered possible. Such combinations must take place sooner or later, and the development of the country is retarded by the government policy of preventing such action until after patents have issued.

In regard to the price of coal land, the old plan of requiring the payment of $20 per acre for land situated within 15 miles of a railroad, and only $10 per acre for land situated 15½ miles distant from the same road, is a senseless regulation. The better plan would be to take some constant, say 500 for example, and divide this by the number of miles the land is situated from a completed railroad, the quotient being the price. For example, land 50 miles distant would be valued at $10 per acre; land 25 miles distant, $20, and land five miles distant, $100 per acre. Thus, the first cost would not be excessive, and since the operator would own the land in fee, the state would have the right to levy taxes. To obviate the objection that the Government would be selling different aggregate thicknesses of coal at the same price, provision might be made for the payment of a royalty of, say, $5 per acre-foot exhausted, which would mean a considerable amount per acre in addition, depending on the aggregate thickness of coal eventually extracted from the land.

In regard to oil and gas lands we have to deal with an entirely different proposition. The present law, as interpreted by the officials of the General Land Office, allows one individual a claim of 20 acres, and eight individuals may associate themselves together for the purpose of drilling one or more wells on their associated claims. But they cannot initiate a right by filing, or otherwise, until oil is discovered. Hence, others may drill on the same land and by making the first discovery may file on and acquire the land on which the first party is drilling. An association of eight individuals dare not incorporate, for a corporation is allowed only 20 acres, the same as one individual; nor can they openly and above-board enlist the aid of capital in what is bound to be a costly operation. It is probably true that a contract to drill a well may be let to an interested corporation and the work secured by notes payable 10 days after demand, which might mean after patent had issued. But why should it be necessary to resort to such methods? The Land Office practice now is to withdraw all neighboring lands from filing as soon as a discovery is made, all endeavor being, in the interest of conservation, to render the development of new oil fields impossible, since the production from 160 acres of land is not sufficient to warrant the putting in of the necessary pipe lines and refineries.

The average cost of well drilling varies in different fields from a minimum of $10,000 to $50,000 per well of 2,500 ft. depth. To obtain the requisite amount of capital for boring in a proved oil or gas field is comparatively easy, but to obtain the same amount of capital for the exploitation of a new and untried field, where the expectations are based purely on geological reasoning, is a different undertaking. Hence, a just and comprehensive law should recognize the distinction between proved and unproved oil and gas lands, and should be so framed as to encourage the discovery of new fields to take the place of the old fields that are rapidly becoming exhausted.

With this object in view an association of, say, four individuals should be allowed to file on an exploration claim of not less than 640 acres of land in legal subdivisions. They should be allowed six months in which to begin actual drilling operations, which should be continued without intermission, except in the case of breakdowns, shortage of fuel, delayed shipments of material, or causes necessitating the abandonment of the well and the transfer of the machinery to a new location on the same claim. Alternately, since weather conditions may interfere, a specified amount of drilling annually might be substituted, as in some state leases. Unless the prescribed requirements are carried out the land should, during such delinquency, become subject to location by others; though until a bona fide filing is made the first declarant should not be required to make proof of good faith—a matter that the mineral inspector should decide by personal examination.

When oil or gas in commercial quantities shall be discovered, or within 30 days thereafter, the declarant should file a statement to that effect in the local land office. The declarant should then be allowed to purchase the land at a stipulated price, or else maintain his right by the expenditure of a certain sum annually, say $2,000, in drilling new wells, laying pipe lines or erecting a refining plant. The discovery of oil or gas should act automatically to create a proved well district within a radius of, say, 10 miles of the discovery well. Subsequent locations or such as were not being drilled at the time of the discovery would then come under the provisions of the second part of the law, which should provide for the filing by four individuals of a declaration on 160 acres in the local land office. To maintain their right, they should be required to begin actual drilling operations within six months, and continue them with reasonable diligence until oil or gas is discovered. Then they should be allowed to patent the land, or in default, expend a certain sum annually, say $1,000 to maintain their right.

E. B. Howell (Butte, Mont.).—With much that is said in the name of conservation I am not in sympathy. If dishonest men take advantage of the present laws, let them be enforced more strictly. If the laws themselves are too lax, let them be amended. If the United States does not get, on the average, what its lands are worth, let the price be raised, but such conditions furnish no reason why rights already honestly accrued should be taken away, nor do they afford any justification for the United States wholly withdrawing its lands from the market.

(1) It is possible that the classification of lands should be made more carefully. Still, no classification from merely surface indications can be made that will prove correct in all cases. Under the present law, the classification of land made by the land department is final. It can rob a man of his mining claim by declaring the land to be agricultural, or it can deprive the settler of his farm by declaring the land mineral, and courts, even the Supreme Court of the United States, will not disturb these judgments.

The proposal to segregate mineral from surface rights does not appeal to me favorably. If a man buys a tract of land he should own it to the center of the earth. Otherwise he will have no motive to develop its mineral wealth, but on the other hand will have every reason to conceal it.

Of course it is true that the United States is not getting all that its public lands are worth, but it never has. For a hundred years it has been disposing of its domain on such liberal terms as to amount to gifts. This policy has worked well in the past and has brought wealth and prosperity to the nation. Why should it be changed? There is a socialistic element in the country that is envious of wealth and especially the wealth derived from resources that formerly belonged to the nation. If we are to follow the program of socialism, then of course the nation ought not to part with any more of its land, but those who believe in private property and individualism in industry should give no heed to this sentiment.

Doubtless there are those who would point to such a mine as the Anaconda, and say that the Government should have its millions instead of private parties, but it is very doubtful if the Anaconda would have ever been developed if the Government had continued to own it. When I first came to Butte, in the Spring of 1880, the first employment I had was to help a surveyor survey the Anaconda lode claim. I remember distinctly how I wondered that any one would spend his money in patenting so unpromising a piece of land. There were several prospecting shafts on the ground, but the blue talc which they yielded looked no better to me than the blue clay that I had seen excavated from wells in Iowa. So far as the surface showing was concerned I was correct enough. It required the expenditure of several hundred thousand dollars of private wealth to demonstrate that my judgment was wrong. But while the Anaconda lode claim made good, there are many thousand lode claims that are hardly worth the government price per acre that has been paid for them.

(2) I would not change the nature of the possessory right now acquired by location and development. It has worked well, has satisfied the miners, and they are used to it. I would, however, make the laws relating to the initiation of such rights uniform in all states and territories. Under the present law, state legislatures and even the miners in each mining district can supplement the federal requirements, with the result that mining law as a whole is hodge-podge. We have worked out a very satisfactory law in Montana as a result of many legal vicissitudes, and this law furnishes a good basis for a new federal law. Possessory rights should be perpetuated by annual labor as at present, although I believe that the year during which annual labor is required should be the fiscal year instead of the calendar. Many claims are inaccessible during the winter months.

(3) I am opposed to the scheme of the Government's merely leasing its mineral claims. This system has been already tried in the history of the United States and was abandoned as unsatisfactory and impracticable. (See Lindley on Mines, Sec. 33-36). If, however, the leasing system is adopted, it should be applied to only two kinds of mines, gold and petroleum, the former in order to regulate the production of gold and thereby stabilize the value of money, the latter because the owner of a comparatively small tract can drain the land all about him.

(4) I am opposed to the doctrine of extralateral rights. It would be all right if mineral veins maintained their identity

and continuity with depth, but they do not, and the inevitable result is litigation resulting in consolidation. It would be better to have claims square, say 1420 ft. each way, permit the claimant to place the boundaries in any way he chooses relative to the outcrop, but when located confine him to his vertical boundaries.

I would abolish the distinction between quartz and placer claims and make the price of the land $5 per acre in each case. This will dispose of the now troublesome question as to whether the placer claim contained "known lodes" at the date of the placer application for patent.

Murray Innes (San Francisco).—After some 25 years' experience in mining in the United States, Mexico and Canada, I have some very decided opinions regarding our mining laws and the incapacity of the men that made them. Our mining laws appear to benefit the lawyers more than the people in general, or anyone else, and are the most complicated and worthless of any that I know. The mining laws of Mexico I consider the best, and no great mistake will be made if we adopt their laws just as they stand today.

All minerals should always belong to the Government and should be entirely separate from surface rights.

No claims should be held by location only, as assessment work is a fraud and a joke, but "patents" to mineral should be readily obtainable from the Government within a few months, as in Mexico, and these patents should hold good just as long as a small mineral tax is paid. I advise small, square claims of about 2½ acres, and a tax of about $3 per claim per year. No limit to number of claims.

All claims to be promptly surveyed and carefully monumented by a U. S. surveyor at a reasonable fee.

Extralateral rights benefit lawyers only and should be promptly done away with.

All minerals should be treated alike, as this would greatly stimulate the mineral industry and all minerals should be at once claimed by the United States. Necessary surface ground and rights of ways should be obtainable at a nominal price from present holders of these surface rights.

I am not a conservationist and I think, for example, that anyone who is willing to pay taxes on a lot of marketable coal in Alaska, build railroads, and otherwise develop that or any other region, thus giving employment to many, should be encouraged and not hampered.

C. E. Jamison (State Geologist of Wyoming).—It is my opinion, in which I believe the great majority of the people of

Wyoming concur, that the present mining laws should be revised somewhat along the following lines:

(A) Doing away with extralateral rights, although recognizing all rights previously conferred.

(B) Providing for the location of oil lands, and allowing not less than 90 days in which the locator may begin development.

(C) Providing for the purchase of oil and coal lands after location and development; oil lands at not more than $10 per acre; coal lands at not more than $50 per acre, the price to be graded in accordance with the kind and value of coal, distance from market, thickness of beds, and depth of beds below the surface.

The mineral lands of Wyoming are of value chiefly for the coal and oil which they contain. The conservation policy, in vogue at this time, tends to retard development, and, in the case of coal, gives to the present operators a practical monopoly.

In view of the above I advocate a provision opening federal lands to entry and location as oil or coal lands, allowing 90 days after location in which to commence work, and protecting the locator in his possessory right as long thereafter as work is actively conducted, but limiting the acreage which may be located in any one district by any locator, or group of locators, to some definite amount—not more than 1280 acres, and debarring any locator from relocating the same lands after abandonment. Should the extralateral rights principle be abolished, a provision should be made by which deep mines may be located, providing for the length of time which may ensue before work must be commenced after location, etc.

Frederic Keffer (Greenwood, B. C.).—(1) Mineral rights and surface should be segregated and all minerals should be open to location, whether upon agricultural lands or not. If upon lands already occupied by farmers, etc., surface rights would have to be secured from owners through purchase. If on public lands, surface rights should be secured at a fixed price per acre.

(2) Mineral rights should be initiated through location of ore in place only; should be secured through a fixed amount of development being done as at present. Rights should be perpetuated by the payment of a fixed tax per acre (whether surface be included or not) and be terminated by failure to pay tax within, say, a year after tax is due.

(3) Mining lands should be permanently alienated, subject only to the payment of taxes. I would, however, advocate leases for placer rights. For metals extracted I would advocate a tax upon the net profits after deducting mining, freight, and treat-

ment charges. And upon coal and oil (especially the former) a fixed price per ton or barrel, with possibly a maximum legal selling price.

(4) To abolish one fruitful cause of mining litigation, and to render it possible for the most unlearned man, without the aid of courts or lawyers, to know what was his and what the other man's, I would do away absolutely with the extralateral rights. And to offset the limitations this would impose, I would increase the allowable width of mining claims. The British Columbia mining law is a model in this regard, both as to size of claims and as to the simple requirements for placing stakes, the three stakes provided by the law being ample for all practical purposes.

Although a United States citizen myself, with possibly a bias toward the institutions of my own country, still, after an extended experience with the laws of Mexico, the United States and British Columbia, I have no hesitancy in affirming that the mining laws of this province are, on the whole, by far the most liberal and the best devised to further the mining industry, and with a few minor changes could well be taken as a model.

J. F. Kemp (Columbia University, New York).—From a deep interest in the matter in charge of your committee I take pleasure in writing you, more especially regarding the terms of the location of claims affecting mineral rights in the public domain. I make no distinction between ores, coal lands, phosphates, oil, or others, for while the area of a claim as here recommended is too small for an individual coal operation, no restriction is placed on combination by purchase. The system of leasing without patent operates against protracted holdings of unutilized land for speculative purposes. While the charges would be low for very productive ground, they would be a serious matter for unproductive, and would be continuous. I have endeavored to average up the general situation for a uniform and easily administered system, neither too hard on the prospector nor too easy on the larger operator. The unit claim is twice the size of the standard one of the present system, but the charges are the same as those demanded today up to the issuance of a patent. They, however, continue the same as a discouragement to speculative holdings, and as a constant pressure for development.

Practically everyone familiar with the uncertainties and difficulties of the present laws involving apex rights to lode claims, must have a profound conviction of their unsatisfactory nature and must be desirous of seeing future locations made upon a different basis. It is important that property rights should be based upon boundaries of such character that they can be established in the simplest way practicable and involve no uncertainties of geological or other interpretation. Vertical planes, determined by surface boundaries and carrying the common-law rights of control from the depths to the sky (*ab ocru ad coelum*) alone fulfil these conditions.

A second condition relates to the shape of claims. They should be of such character that they will arrange themselves without necessarily involving small intervals or fractional claims. Of the available geometrical forms the square is the one possessing the greatest advantages and is the one most easy to survey and accurately establish. The boundaries should be referred to the true North, allowance being made for the convergence of meridians where, in far Northern latitudes, this is of sufficient amount to be appreciable.

The size of the claim conforms to the standard unit now generally established as the smallest sub-division of agricultural land, and the location with true North and South, East and West sides conforms also to the practice of the Land Office. The size of the claim is smaller than the British Columbia unit of 1500 ft. on a side.

It is important that provision should be so made that tracts covered by claim be not held indefinitely for speculative purposes and pressure to develop must be brought to bear upon holders. This can be done only by annual charges.

It is furthermore important that the privilege of indefinitely making locations should not be extended as now to any one individual; and it is also important that the exercise of the rights of power of attorney should not be permitted.

It is important that after discovery a reasonable time should be allowed for filing the claim with the proper official, but *no more* than a reasonable time should be permitted. It is difficult to establish a definite limit for the varying conditions of our country, but the object sought by the law is to assure the first discoverer security against claim jumpers and yet not to permit the mere posting of a notice to hamper the activities of other legitimate prospectors.

I am of the opinion that a system of annual rental or leasing from the Government, similar to the concessions of Mexico, is preferable to patents and ownership as now prevailing. Many prospectors and miners now prefer to work their claims on the annual assessment basis rather than to encounter the supervision of such officials as are provided by the Forestry Bureau or other departments of the Government when application for patent is made. It is important to avoid as far as possible the difficulties which arise from incompetent or corrupt officials.

Experience has shown, furthermore, that it is of the highest importance to provide that the rulings of an executive officer regarding property rights be subject to review by the courts. The spectacle of the Land Office, for example, under the Department of the Interior, receiving the $10 per acre from the Cunningham coal claimants in the Behring River fields, Alaska, $52,000 in all, and then denying the patents while retaining the money, is one which can only destroy respect for constituted authority. Courts of Appeal are necessary in these matters, as in customs duties or similar opportunities for executive abuses.

Of even greater importance than anything hitherto mentioned, and of bed-rock fundamental nature, is it so to shape the laws that initiative and enterprise will be rewarded, especially in so uncertain a branch of activity as developing mineral resources. The successes are few in comparison with the many attempts, and the rewards, though in instances they have been great in the past, are far from disproportionately so in comparison with the pathetic number of failures. We may well seek to maintain the United States as the land of opportunity in which exceptional energy or thrift or foresight will be assured its proper reward.

There may be and probably are other fundamental important matters, such as inspectors who will annually examine records, assessment work on claims, and the like, to insure the proper performance of stipulations, but I do not feel sufficiently familiar with all the phases to formulate these off-hand.

My suggestions as to the practical details are as follows:

In the location of a claim for either deep mining (often called distinctively quartz mining as against placer mining) or placer mining, the presence of minerals carrying valuable components must be shown by a discovery excavation, or else in the same way such characteristic associates of the minerals must be shown as would justify the miner in following them in his search for valuable deposits.

An excavation or discovery shaft must be established as an essential, and labeled as such, with a written notice upon a post firmly set in the ground or firmly supported by a pile of loose rocks if on a bare ledge. The claim must then be located in the following manner so as to embrace the discovery shaft within its boundaries: A point shall be selected and established called the central point. It shall be indicated by a suitably labeled post, firmly supported. Through this central point a line shall later be run in a direction as nearly as possible, according to the true North and South, and a second line at right angles to this first line and through the central point, according to the true East and West. These lines shall be extended in each of the cardinal directions, North, South, East and West, one-eighth of a mile, or 660 ft., measured in a horizontal plane or planes, from the central point, or as nearly so as may be feasible at the time; the measurements to be subject to accurate correction subsequently by a deputy U. S. mineral surveyor when the plat is made. Lines perpendicular to these intersecting lines and at their outer ends shall then be run so as to enclose a square embracing an area of 40 acres, or a "forty" as understood in the general subdivision of agricultural land. This forty shall constitute a full claim. For its location the central point shall be the essential thing. Within a reasonable time after filing his claim the locator shall establish posts at each corner of his claim and at the middle points of the sides, as nearly as he may, all being subject to revision from his central point, which shall not be changed. Previously to filing his claim the locator shall establish the position of his central point with reference to some natural landmark or some older claim in such manner that it may be easily found and identified.

Priority of location shall always carry priority of rights. Later locations shall be made to conform to earlier ones—and by the area of earlier ones their areas shall be determined. Fractional claims may be located only when made necessary by prior full claims.

Only one claim, whether of full or fractional area, shall be made in any one mining district by the same individual. It must be made by the locator in person. The exercise of power of attorney will not be permitted.

Having located a claim, the locator shall at once, and in the shortest time which may be reasonably allowed for the journey, proceed in person to the nearest recorder of claims and file with him the record of his location. A fee of $5 shall be charged for this record. If the locator has not previously established the corner posts of his claim, he shall with the same reasonable expedition return to his claim and set them.

From the date of recording the claim, a charge of 25c. per acre per month or fraction of a month for the current year, or of $3 per acre per year, dating from the opening of the next calendar year, shall be paid to the recorder of claims. Failure to pay at the recorder's office the charge for any full claim or part of a full claim, before the end of any full year during which it accumulates, will efface all rights of the locator to said claim, and said rights shall not again be renewable by him. The claim shall then be open to re-location by others. Before the end of the calendar year next following the one in which the claim was recorded the locator shall cause to be made and filed by a deputy U. S. mineral surveyor a plat of the claim, and said surveyor shall accurately establish the corner posts and middle points of the sides. Failing to do this, title to the claim shall lapse and shall not be renewed by the same locator. When once located and established by a plat, a claim for a period of ten years after the lapsing of title must be re-located as of the original area and situation.

At the end of five years from the beginning of the calendar year next following the one in which the location is made, an amount of work equal to $12 per acre of area must have been done on the claim, or else the title shall lapse, and shall not be renewed by the same individual. This work may be done at one point for the entire claim or may be distributed over it.

At the end of a second five years an additional equal amount must be made in order to hold the title, and so on for each subsequent period of five years, a similar expenditure.

Titles to claims may be sold by one person to another, but such transfers shall in no way affect the conditions prescribed for the original locator. A subsequent owner shall stand in the place of the original locator and in the scope of the law shall be considered *ipso facto* the original locator, subject to all the conditions above prescribed. If said subsequent acquirer of title fails to meet the conditions so that his title lapses, earlier holders of the title may severally be permitted to re-locate said claim.

No limit shall be set to the acquisition of claims by purchase by one individual or association.

No patent shall be issued, nor title to permanent ownership of any claim or claims, but the title to the claim shall be in the nature of a lease from the U. S. Land Office, subject to the conditions above prescribed.

No rights conferred prior to the passage of the act of legislation carrying the above provision into effect shall in any way be affected by it. They are to be secured and maintained as an inviolable obligation, but all new claims and all claims which have lapsed under the old system shall be located according to the new law.

The holder of a claim or fraction of a claim shall be entitled to all the minerals within the vertical planes passing through his boundaries, and to all surface rights except such as are affected by necessary right of way for adjacent or neighboring claims, or by duly established restrictions regarding the use of timber in forest reserves or the like.

All the public lands, unless specifically reserved by Act of Congress, shall be open to the location of claims as above prescribed and without regard to the nature of the valuable mineral, whether ores, coal, phosphates or any other.

Any disagreement between a locator and an official of the General Land Office shall be subject to review by the United States Courts, but pending the decision of a case, a locator must maintain the annual charges and the assessment work, subject to a return of the same by the General Land Office in case the decision of the court is against him. (This may be impossible, for constitutional limitations, but if possible, some check on the Department of the

Interior has been shown by experience to be highly desirable, if not absolutely necessary.)

George F. Kunz (401 Fifth Avenue, New York).—My convictions are as follows:

(1) That the Government should exclude all minerals from surface rights; that is, the Government should have the exclusive right to all minerals on whatever land they may be found, but that it should compensate owners for damages done to the land in working.

(2) That the possessory right should be vested in the Government, and perhaps worked on the same principle as the Premier Diamond mine in South Africa, in which the Government receives a certain percentage of the profits. Mining rights could be initiated for a time, the Government having the right to condemn them if proper compensation is made to investors, provided the venture has not proved a failure.

(3) Mineral lands, with rare exceptions, should not be permanently alienated or leased. If it is in the interest of better production that there should be consolidations, owing to the peculiar lay of the veins in the land itself, then such mines should be consolidated or worked together to produce the best results with the least possible outlay. If the lands are leased there should be not only a rental from them, but a percentage of profit such as a price per ton, pound, ounce, or gallon, according to the substances mined. Care should be taken that no petroleum wells that could be exhausted within a year are rented for a small annual sum.

(4) If the present system of alienation of title be retained, there ought to be a clear definition of the extralateral rights principle. It should be defined in such a manner that the financial yield will not be hampered by unnecessary difficulties.

Alfred C. Lane (Tufts College, Boston, Mass.).—(1) It is not possible to segregate all minerals from surface rights. No one can draw a fair line between the mining of ore on the Mesabi Range and the mining of limestone for the manufacture of cement and the mining of limestone to burn for building lime, and there is no telling when a clay bank may become an ore of aluminum.

(2) I advocate different provisions for petroleum, salt brines, and gas, where the product is likely to come from more than one tract from that of metals. Oil is not a mineral and is not mined. The rights to explore for oil and gas should be separated from the surface rights and should be handled in blocks

large enough to warrant economic exploitation. Conditions may vary in different parts of the country. In Michigan, for instance, I should recommend that not much less nor greater unit for leasing should be granted than a county, that proper provision be made for damages in exploitation, and that a proper royalty be paid the county, land owners, and State, in case of success.

(3) The extralateral rights principle should not be retained.

Francis C. Lincoln (University of Illinois, Urbana, Ill.).—(1) Mineral and surface rights should not be segregated, under ordinary conditions.

(2) The possessory right to mining properties should be initiated by properly staking the ground and posting and recording suitable notices, and continued by the yearly performance of an amount of work in excess of that at present required. It should be terminated by failure to do said work.

(3) All mineral lands should be leased; the only special provisions for the different minerals should be the size of claim permitted for each.

(4) Extralateral rights should be abolished and vertical side lines substituted.

The present method of taking up mineral ground has the disadvantage that, owing to the small amount of work which need be done annually in order to hold the ground, it is customary for small prospectors to spread their work over wide areas of country and accomplish much less than if their work were concentrated. The effect of permitting the patenting of ground is very similar, as large tracts of ground are patented and held for long periods of years without any attempt at exploration. It, therefore, seems to me that if the possessory right to mining property were acquired in somewhat similar fashion to that employed at present (with the omission of the requirement of discovery), and the quantity of work required were increased, say to $500 per claim per year instead of $100, our mineral lands would be much more rapidly and economically developed than they are at the present time. Moreover, by having all lands held under lease instead of patent, a beneficial supervision could be more readily exercised by the Government than is possible at the present time.

Henry Louis (Newcastle-on-Tyne, England).—After considerable experience with the various forms of tenure of mineral property, I am inclined to favor the concession system, and I think that a law embodying the leading principles of German, French, Spanish and Scandinavian mining laws would probably be the best and most equitable. The leading principle is that all minerals without distinction are the property of the state, and should be administered for the benefit of the state, ownership of minerals being independent of ownership of the surface. Ownership of the surface should carry with it the right to work superficial rocks, e. g., brick clay, chalk, building materials, etc.; possibly peat might have to be included. I think that the ownership of the surface should cease at permanent water level. Other minerals of all kinds whatever should without distinction be regarded as the property of the state. The working of minerals by the state is objectionable, and hence the state must be prepared to grant concessions to suitable parties, individuals or corporations for the working of the minerals. Herein the two ancient fundamental canons of German mining law should apply: "Prospecting is free to everyone" and "The first discoverer is the first concessionaire." Modern exigencies have compelled a modification of the latter canon so far that the first finder receives the concession only if he can demonstrate his power to work the same suitably; otherwise he receives compensation from the party to whom the concession may be granted.

The procedure should be as follows: Anybody wishing to prospect must take out a license for prospecting within a given area, for which he pays a nominal fee, but must at the same time deposit an agreed sum as security for damage that his operations may cause; this latter would be unnecessary for prospectors in uninhabited regions. When any mineral is discovered, the prospector should apply for concession to work it, which is granted him if he can demonstrate the possession of the necessary means for exploiting the deposits; otherwise the concession should be thrown open to public competition, the successful concessionaire paying the prospector either a lump sum, a dead rent, or a percentage. A concession should be for a limited period, say one to three years, renewable absolutely at the will of the concessionaire so as to ensure fixity of tenure, but only so long as work on an agreed scale is carried on. Such a clause is indispensable; otherwise you have the evils with which we are familiar in Spain, of capitalists holding large areas of mineral lands under concession, and for the purpose of working them, but merely as a speculation. I need hardly say that this is a serious hindrance to the development of the mineral riches of the country. The concessionaire should pay the state an annual dead rent plus a tonnage rate on minerals wrought, at an agreed scale.

Mineral concessions should in every case be rectangles of a suitable size, and mineral rights should be bounded by vertical planes; I can see no justification for the law of the apex and extralateral rights.

OBITUARY

Francis T. Havard.—The University of Wisconsin, and especially the College of Engineering, has suffered a great loss in the death of Professor Francis T. Havard, Associate Professor of Metallurgy, who had been with the University for four years. He was taken ill with pneumonia in April last and had apparently conquered the disease when general toxemia intervened, against which he was unable to rally, and the end came on May 22, at the Madison General Hospital.

Mr. Havard was born at Ipswich, Australia, Oct. 19, 1878. After his grammar-school training he entered Sydney University with advanced standing, and in 1897 went to the Bergakademie, Freiberg, Saxony, graduating from there as a metallurgical engineer in December, 1901. Immediately thereafter he came to the United States and entered the employment of the Boston-Montana Co. at Great Falls, Mont., in the capacity of chemist and furnace foreman. In 1903 he accepted the position of manager of the smelting works of the Anhalt Lead & Silver Mining Co., in Germany, in which he had unique experience in successfully handling a wide variety of metallurgical products. In 1906 Mr. Havard accepted the management of the smelting works of the Copiapo Mining Co. in Chile, returning to the United States in 1908, when he was engaged in some special metallurgical work for the U. S. Metals Refining Co. and others.

Mr. Havard went to the University of Wisconsin in the fall of 1909, and his record of technical, educational and social achievement there is known to a wide circle of friends. In 1908 he married Miss Margaret Raleigh, of Helena, Mont., and he is survived by his wife and one son.

Mr. Havard was a man of rare personality, of cosmopolitan culture and scholarly ability. His genial humor, broad sympathies and high ideals were an inspiration to all who were privileged to know him. For many years he was a valued contributor to the *Engineering and Mining Journal* and to "The Mineral Industry." In his writings he exhibited a clear discernment and the possession of a polished literary style. His recently published treatise on "Refractories and Furnaces" has attracted wide and favorable attention.

CHANGES IN ADDRESS

Burch, Albert	Goldfield Cons. Mines Co., Goldfield, Nev.
d'Invilliers, E. V.	518 Walnut St., Philadelphia, Pa.
Dwight, A. S.	29 Broadway, New York
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Mining and Metallurgical Society *of* America

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ANNOUNCEMENTS.

Report of Committee on Mining Law.—In the last bulletin were published a number of communications received by the Committee on Mining Law, in response to its letter asking for opinions of members and others, which letter was reproduced. Additional replies are given in this bulletin and these will be followed in subsequent issues by opinions received from other organizations and reports of experience in foreign countries.

Bound Volumes.—Bound volumes of the bulletin of the Society for 1912 may be obtained from the Secretary for the price of $1.50. Any member desiring a complete set of the bulletins for 1912 unbound can obtain it, free of charge, by application to the Secretary. Volume IV (1911) may be obtained at the same price, but no complete sets of bulletins published prior to 1911 are now available.

San Francisco Section.—The members of the San Francisco section joined with the members of the American Institute of Mining Engineers, residing in or near San Francisco, and gave a dinner on May 23 at the Bellevue Hotel to Dr. J. A. Holmes. H. C. Hoover presided. Following the dinner there was a series of short talks as follows, after which there was general discussion: "The United States Bureau of Mines," J. A. Holmes; "The Bureau and the Mining Man," F. W. Bradley; "Need of a Local Section of the A. I. M. E.," H. Foster Bain; "Relations of the A. I. M. E. and the M. M. S. A.," S. B. Christy.

A committee was appointed, with Professor Christy as chairman, to take up the matter of organization of the local section of the A. I. M. E. and to arrange a joint program, or to determine the relation that this section should bear to the M. M. S. A.

Annual Medal.—The Society has adopted the following rules covering the award of annual medal:

1. A gold medal shall be awarded by this Society each year for conspicuous professional or public service for the advancement of the science of Mining, of Metallurgy, or of Economic Geology; for the betterment of the conditions under

which these industries are carried on, for the protection of mine investors, and especially for the better protection of the health and safety of workmen in mines and metallurgical establishments.

2. This medal shall be awarded at the annual meeting of the Society in January.

3. Six months before the award the Secretary shall send a circular letter to all members requesting suggestions as to the specific object for which the medal shall be awarded and asking for the nomination of candidates on a form provided for the purpose, such nominations to be accompanied by a full statement of the claims of the candidates for consideration. These nominations shall not be confined to members of the Society and may include other nationalities than our own.

4. Four months before the award of the medal the Council shall determine the specific object for which the medal is to be awarded. All nominations of candidates whose claims to recognition lie in that special field of work shall then be considered by a committee of three to be appointed by the President. At least two months before the award this committee shall submit a list of two names to the Council with full statement of the claims of each candidate. The committee may consider and recommend names not nominated by members of the Society. The names so recommended shall be submitted to the Council for election by letter ballot.

5. For the election of a candidate a majority vote of the Council shall be necessary. If this majority be not obtained on the first election other ballots may be taken either by letter or at a meeting of the Council called for the purpose. At such meeting members of the Council may be represented in proxy.

In conformity with the above rules the Secretary has issued a circular letter to the members of the Society as follows:

New York, July 1, 1913.

Dear Sir:

According to the rules for the award of the annual medal of the Society, the Secretary is required, six months before the award at the annual meeting of the Society in January, to send a circular letter to all members requesting suggestions as to the specific object for which the medal shall be awarded, and asking for the nomination of candidates on a form provided for the purpose, such nominations to be accompanied by a full statement of the claims of candidates for consideration. In conformity with the terms of the rules such a form is sent you herewith. It is requested that you promptly make a nomination, or nominations, on this form and return the latter to the Secretary.

Yours very truly, W. R. Ingalls, *Secretary.*

COMMUNICATIONS

The following letters were received by the Committee on Mining Law in response to its letter asking for opinions of members and others. The first instalment of the replies was published in Bulletin No. 60:—

John R. Lucas (Philipsburg, Mont.).—(1) I believe that the classification of Government lands, especially the mineral kinds, under the present system as set forth in the Statutes of the United States, is perfectly satisfactory, but I, like others, object to the laying down of new rules by the Land Department every time a change of administration occurs. It seems to me that the requirements to obtain a patent from the Government, both for placer and lode locations, are simple; but to comply with the various rulings made by the different heads of the Land Department is something almost impossible. I believe that the surface and mineral rights to land should go together, and that there should be no segregation of the same, for in most cases it is absolutely necessary to have the right to the surface in order to operate either lode or placer mines.

(2) I believe that the present system of locating lode and placer mining claims, requiring a mineral discovery, the marking of boundaries, and the recording of them in the office of the county recorder, is satisfactory and sufficient. I also believe that the present system of holding mining claims by annual representation work of at least $100 per claim, or by a total expenditure on development and improvements of $500 for each claim, and by the payment of the government fee at so much per acre, is a satisfactory way to obtain title. However, the deputy U. S. mineral surveyor should be fully instructed as to all the requirements of the Government which are necessary to enable one to obtain a patent. Then, in case of any defect in title, it could be perfected before the papers are sent to the Land Office, thereby saving considerable time and expense. Under the present system the method of handling this work is very unsatisfactory. For instance, when a claim is located upon the forest reserve, its mineral value has to be passed upon by the Forestry Department, which it seems in some cases is inimical to the mining interests, and unless an extra good showing is made that department usually adverses the application, making it necessary to have a trial before a commissioner appointed by the Land Department. In most cases it is practically impossible to prove that you have a paying mine with an expenditure of only $500 or $600.

(3) I believe that the mineral lands should be permanently alienated, and not leased by the Government.

(4) If the present system of alienation of title is retained, I believe that we should still keep the extralateral rights principle. However, if the Government sees fit to make a change in the boundaries of lode claims, say, to the British Columbia dimensions, 1500 ft. square, then vertical planes should govern.

Hugh F. Marriott (1, London Wall Buildings, London, E. C.).—(1) All minerals primarily belong to the nation possessing the country in which those minerals exist, and are an asset of the people as a whole; they should be leased to sub-owners on conditions which would ensure their being turned to account to the general progress of the community. In countries where this right has not been asserted by the nation, and where parties—who have in the first instance only acquired the land rights for any surface value it may possess—have been permitted to consider that discoveries of minerals within the boundaries of such land are also their sole possession, custom has alienated the primary right of the nation and placed it in the hands of the individual owner, and it cannot now be legitimately withdrawn from him, as that would be a direct violation of what is now acknowledged as legal possession. In cases where no mining values have yet been found or indicated, and where no payment has been made for possible mineral values, there no hardship can result from altering the titles to the exclusion of the individual holder from any rights to future mineral finds below the surface, provided always that should any development take place with regard to minerals yet to be found which would cause any disturbance or deterioration of the surface held by the owner previous to the alteration of the title, then the Government should be liable to compensate the owner of such title on equitable lines. All future transactions in surface rights should be subject to the same terms. When a transference of ground held under the old inclusive conditions takes place, a time limit should be placed on the individual ownership of any presumed but undeveloped underlying minerals, based on a period beyond which the alteration of present value of presumed and undeveloped underground rights is commercially negligible—say 50 or 60 years.

(2) Mining rights should be granted on conditions which would ensure the due development of the ground at such times as the nature and position of the deposit render it advisable.

(3) Mining leases should be subject to a moderate government royalty when work is proceeding, and to an increased liability in the case of deliberate inaction when progress is commercially possible. Once having granted them on these conditions, they

should not be terminated except with the consent of the owners. There is great difficulty in making a clause preventing strong combinations from locking up properties which are easily capable of profitable production.

(4) If your fourth question is meant to refer to the right of an owner of an apex to follow his ore down indefinitely, there is no doubt that what has already been given to the owners cannot be legitimately taken away. It would, however, be quite fair to call upon owners of these indefinite rights to put in a claim giving vertical boundaries of the ground they have reason to suppose will be included in their rights, on the understanding that such a boundary has to be fixed, and that, failing agreement with the state engineers, the matter will be referred to an independent body of men who will give irrevocable decisions.

In the future all boundaries should be vertical without any exception whatever.

Walter McDermott (3, London Wall Buildings, London, E. C.).—(1) Lands taken as agricultural should be open to development for minerals by others, if it is not done by the owner.

(2) Possessory right should continue to be initiated in some such manner as at present, but without the essential of definite discovery of apex. It should be subject to continuous working under reasonable conditions of exemption for *force majeure* and for a term of years' renewal, as in Australia, except for good reasons.

(3) See No. 2 as to terms on which all minerals should be treated alike.

(4) Area should be definite and unquestionable, as in all other civilized and most uncivilized countries. Extralateral rights are based on a supposed regularity of deposits which does not exist in nature. All the experience of the United States is directly opposed to it in practice; it is unworkable and has had to be dodged by agreements, by local rulings of courts, or by death of litigants. Areas should be large enough to justify working on a large scale, and extra surface rights could be allowed on certain conditions as to active work on the dip, while deep-level claims might be allowed to non-holders on the terms of active sinking for development, not as a holding for possible future value.

Philip N. Moore.—(1) I favor a classification of lands, and separation by the Government of the title to minerals from the surface rights.

(2) Mining rights should be initiated by a valid discovery of mineral which has some reasonable prospect of becoming workable at an early date. No title should accrue until after confirmation of such discovery by an officer of the Government, but a reasonably

limited time should be given after location for locator to make such discovery, in order to prevent speculative locations. A certain substantial payment should be required in advance, or continuous operation with a limited force during the period granted for discovery.

Possessory rights, after discovery, should be terminated upon failure to make a certain fixed and substantial payment to the Government.

(3) Mineral lands should be leased for long periods of time, but subject to continuous fixed payment to the Government, which payment should increase in proportion to the area held by one person, or organization, and title should lapse to the Government upon cessation of such payment.

No patent should be granted for mineral lands which will permit them to remain unused or untaxed. The minimum payments required should be of a substantial nature, so as to render the speculative holding of mineral claims, from which this country is at present suffering, practically impossible. The present method of requiring a fixed amount of labor in lieu of taxes should be abandoned.

The conditions of tenure should differ for the precious metals, and for coal, petroleum or the cheaper metals.

(4) The extralateral rights principle should not be retained in any circumstances.

As an *obiter dictum* I may say that I have had much observation of the mining law in Mexico, which I consider to be vastly superior to that of the United States. This law could be improved in some respects, but the essential part of it is included in my recommendations above, namely that continuous payment must be made at frequent intervals, thrice per annum, or the title lapses to the Government, and the tract becomes subject to re-location.

Henry S. Munroe.—(1) As I understand this question we have here two distinct policies, one, the classification of lands, as at present, into agricultural lands and mineral lands in which the mineral lands are not open to preemption for agricultural purposes, and in which the agricultural lands are sold without reservation of mineral rights. The second half of the question apparently refers to the adoption of the new policy of the reservation of mineral rights by the Government in all lands hereafter sold for agricultural purposes. In other words, it is a separation of mineral rights from surface rights. I am heartily in favor of the second policy, which should, however, be used as supplementary to the existing plan of segregation and not to replace it altogether.

(2) I believe that some plan should be formulated by which the prospecting and developing of our mineral resources shall be

encouraged to the utmost. The present plan has certainly given very remarkable results in these two directions. Nevertheless there are some very serious abuses which have crept in under the very liberal policy adopted by our Government, and these abuses should be checked. I am not prepared at present to advocate the Mexican system of concessions, which is really a leasing system. I think, however, that the possibility of holding mineral rights indefinitely without attempting to develop or utilize these rights should be rendered impossible. I confess I do not see clearly myself how this can be done. The chief difficulty lies in the vested rights already secured under the present law by the owners of mining claims and by those who have secured absolute title by patenting such claims. Unless we can reach these vested rights in some way, I think it is idle to discuss any change of the law in this particular, as the greater part of the mineral resources of the country has already been alienated in one or another of these ways; so that a new law affecting what remains would be a partial solution only and would make the situation worse rather than better. I think, therefore, that your committee should consider the possibility of terminating existing rights that are not utilized in some way. Two methods suggest themselves as possible. One is by taxation of claims, possibly at an increasing rate, so as to render it expensive to hold claims without utilizing them. The principal objection to this is, of course, that it will impose an additional burden on operating companies who are forced to acquire mining claims of little value, either for protection against litigation or as possible reserve ground for future exploration and development. I am not sure, however, that an excessive use of such powers by operating companies is not to be deprecated in their case as well as in the case of individuals. Of course any such remedy by taxation will probably have to be initiated and carried out by the states and therefore falls outside of the powers of the general government.

A second plan is to provide for condemnation of land not utilized, on the ground that it is contrary to the public interest to have mineral resources locked up and not utilized. Arrangements should therefore be made so that mining companies interested can obtain title to mineral lands by condemnation proceedings as railroads now acquire a right of way.

(3) I heartily believe in the policy of the permanent alienation of mineral lands rather than any system of leasing. We have gone too far in this country in this direction to consider for a moment a change of policy. The objections to a leasing system are so many and so serious that I for one should be very sorry to see it initiated.

(4) I believe that the extralateral right should be omitted

from all sales of mineral land in the future and that provision should be made for the extinguishment of all existing extralateral rights by condemnation proceedings, even should this require a constitutional amendment, unless such rights are utilized within a definite period of years from the date of the passage of the new law.

Ralph Nichols.—Having been a deputy mineral surveyor since 1878 in Colorado, Idaho and Nevada, I am familiar with the litigation in this country since that date.

I am of the opinion that our mining laws, as they now exist, are absolutely the worst laws adopted by any civilized country. The Mexican laws are superior to ours, but of all the laws I am familiar with I think the leasing system as practiced in Australia is superior to any I have had the pleasure of working under. The leasing system in Australia is good, but the methods of administering it I cannot recommend.

We cannot afford to adopt the mining laws of any other country, but can use the laws of other countries as a guide to amend our own. We cannot afford to adopt new laws without first appointing a commission, similar to the Tariff Commission, of men familiar with laws of other countries and capable of selecting the best from all.

I am a believer in extralateral rights, but the interpretation of such rights should be more clearly defined so that less litigation would result.

E. E. Olcott (36 Wall Street, New York).—(1) I think a segregation of minerals from surface rights to land advisable; but it should be clearly defined what may be considered, in such segregation, as minerals. Certain mineral industries are carried on very often in an exceedingly small way, at least so far as the majority of the enterprises occupying themselves with such affairs are concerned. In such case the imposition of a mineral tax would probably mean that its collection would cost more than it would return. I should think this would often be the case in the quarrying of limestone for the burning of lime, or for fluxing ores at smelters, although in the latter business the quantity carried would probably be considerable.

(2) I call to mind that in many countries no sort of title to exploitation of minerals is conveyed when a mining enterprise is initiated; but simply the right to prospect with the privilege of turning this prospecting right into an active mining right as soon as the owner may have developed his property. It would seem that in this country a stiff cash payment and annual tax might, in many cases, be needed to bring about active development work of the

territory held under prospecting rights. The present system of assessment work has often been fraudulently administered. It would seem that if a man makes a discovery which he thinks valuable, the law should demand that he state it clearly with some sort of permanent mark, not so loosely as is now done; and that he should then have a certain limited time within which to place the area so staked on record as claimed by him for prospecting purposes. I should think that in addition to such payments a certain amount of work should be demanded, as is now the case. Failure to do the work or to make the payments on time should constitute a lapsing of the title to the Government.

(3) It seems to me that it will be difficult to procure proper exploitation of deposits if the owners in contemplation were not assured that they would be allowed a sufficient length of time to exploit completely the territory which might be allotted to them.

I think the Government would do well to name a simple royalty, whatever it may be, ¼, or ½ or 1 to 2% on the gross value of the ore shipped. I do not think that any allowances should be made for deductions of freight or treatment or loss. The sales returns should be subject to examination by the Government and the tax levied accordingly. Whether this tax should be varied for different minerals might be a question for consideration; but I think it should be a simple and uniform tax based entirely on the gross shipments, but that its size should make reasonable allowance for the average losses and expenses. Of course this does not mean a uniformity of taxation on all minerals of the same kind because the conditions under which they are produced will vary in all sorts of ways; but it seems to me to preclude more closely than any other policy the chances of fraud and the possibility of recriminations on the part of the Administration which has recently played so large a part in the functions of Government at Washington.

(4) I should most unqualifiedly suggest the abandonment of the extralateral rights principle in every possible form it may have assumed heretofore. It has been one of the greatest nuisances in the American mining law, and I believe was originally implanted in that law with the idea of creating strife and friction and business for certain classes of professional men.

George A. Packard (Butte, Mont.).—Speaking in general on the group of questions, it should be obvious that, in order to encourage development of our resources, the following points should be kept in mind:

(A) Initiation of possessory right should be by as simple and inexpensive procedure as is consistent with a properly defined location and record.

(B) Title must possess no element of uncertainty, should be perpetuated at a minimum of expense for a sufficient period to permit of reasonable exploration, and should be continued under conditions taxing non-production.

(C) The possessory right should terminate and the property revert to the state when it is unworked and non-productive for any considerable period.

Anyone who has been familiar with the mining districts of the West for the past 20 years must be impressed by the gradual decrease in prospecting, the discontinuance of grubstaking, the reduction in number of small mining camps which formerly dotted the country, and the concentration of development and exploitation about the more important mining centers. That such more thorough exploration of a given field is advantageous is without question. True conservation demands it. But development of new fields is necessary, and to this end prospecting should be encouraged. For this reason, and in view of the decadence of prospecting, the initiation of title should be kept within the means of that class which we wish to encourage.

In the winter of 1904 and 1905 I made a study of the mineral land laws and, after consultation with members of the Land Commission appointed by President Roosevelt, which was then considering that subject, published in the *Engineering and Mining Journal* for April 27, 1905, a proposed amendment to sections 2320, 2322, and 2324 of the Revised Statutes. A copy of these sections, as I have proposed to amend them, follows:

> "SECTION 2320. Mining claims upon veins or lodes of quartz or other rock in place, bearing gold, silver, cinnabar, lead, tin, copper or other valuable deposits heretofore located, shall be governed by the customs, regulations and laws in force at the date of their location. A mining claim located after the first day of January, nineteen hundred and seven, whether located by one or more persons, may equal, but shall not exceed, one thousand five hundred feet in length, and may equal, but shall not exceed, six hundred feet in width; all of the angles shall be right angles, excepting in cases where a boundary line of a previously located claim shall be adopted as common to both claims. No location of a mining claim shall be made until the discovery of a vein, lode or deposit of ore in place within the limits of the claim located; excepting that upon mineral lands where the presence of a vein, lode or deposit of ore in place is indicated, a location may be made; provided that if at the end of three years the presence of a vein, lode or deposit of ore in place shall not have been discovered, the claim upon which such failure occurred shall be open to re-location in the same manner as if no location of the same had ever been made."

> "SECTION 2322. The locators of all mining locations heretofore made or which shall hereafter be made, on any mineral lands of the public domain, their heirs and assigns, so long as they comply with the laws of the United States, and with State, Territorial and local regulations not in conflict with the laws of the United States governing their possessing title, shall have the exclusive right of possession and enjoyment of all the surface included

within the lines of their locations, and of all the ground which lies inside of such surface lines extended vertically."

"SECTION 2324. The miners of each mining district may make regulations not in conflict with the laws of the United States, nor with the laws of the State or Territory in which the district is situated, governing the location, manner of recording amount of work necessary to hold possession of a mining claim, subject to the following requirements: A location notice, protected from the weather, shall be posted immediately upon location in a conspicuous place at the point where the work is begun, which notice shall contain, first, the name of the location; second, the name of the locator; third, the date of the location. There shall also be added within thirty days to the above information, fourth, the number of feet in length claimed on each side of the location point; sixth, the general direction of the claim. The location must, within thirty days, be distinctly marked on the ground so that its boundaries can be readily traced by marking trees or rocks in place, or by firmly setting posts or stones, said trees, rocks, posts or stones to be at least four inches square and four feet above the ground and surrounded with a mound of earth or stones not less than four feet diameter at the base and thirty inches high, said monuments to be so placed along the boundaries that from any one monument the preceding as well as the following one may be seen. Where a corner or other point requiring a monument is inaccessible, the monument must be placed as near thereto as practicable and so marked as to indicate the true location of such corner. Such monuments must be maintained so that the boundaries of the claim can at all times be readily traced, and the name of the claim determined. Upon each claim located prior to the first day of July of any year there shall be expended within one hundred and twenty days of the date of location not less than one hundred dollars for labor and improvements; but if the claim be located later than the thirtieth day of June of any year there shall be expended upon it within one hundred and twenty days not less than fifty dollars for labor and improvements. All mining claims located after January first, nineteen hundred and seven, shall be recorded at the United States Land Office of the district in which they lie within forty days after location if located within one hundred miles of said office, but for every additional ten miles one additional day shall be allowed. All records of mining claims hereafter made shall contain the name or names of the locators, the date of the location and a sworn statement that a location notice has been posted and the boundaries of the claim marked on the ground as required by this statute, and said records shall also contain such a description of the claim or claims located by reference to some natural object or permanent monument as will identify the claim, a statement of what claim or claims it adjoins, and a description of the boundaries as stated in the location notice posted on the claim. And where the lands are surveyed by the United States, said description shall include a statement of the section or sections in which said claim lies, and said section or sections shall not thereafter, unless this claim be abandoned, be disposed of as timber land or agricultural land, or for any other purpose without investigation of this claim and notice to the locators thereof. Upon each mining claim located upon the public lands and until a patent has been issued therefor, not less than one hundred dollars' worth of labor shall be performed or improvements made during each year, or, in lieu thereof, payments of such sum made to the United States Land Office for that district; but where such claims are held in common such expenditure may be made upon any one claim if for the advantage of all; the cost of a survey of a mineral claim, to an amount not exceeding one hundred dollars, may be recorded as assessment work if such survey be made by a United States Deputy Mineral Surveyor and filed with the Land

Office of the district. An affidavit stating that such work has been done, or such sum paid, and that all monuments are in proper conditions, shall be filed with the Land Office of the district prior to the expiration of the year, and failure to file such affidavit shall be deemed a notice that the claim is abandoned; provided, however, that if the assessment work has been done within the year and not recorded, it may be recorded within thirty days after the expiration of the year by the payment of an additional fee of ten dollars; and upon a failure to comply with these conditions, the claim or mine upon which such failure occurred shall be opened to re-location in the same manner as if no location of the same had ever been made. Upon the failure of any one of several co-owners to contribute his proportion of the expenditures required hereby, the co-owners who have performed the labor or made the improvements may, at the expiration of the year, give such delinquent co-owner personal notice in writing or notice by publication in the newspaper published nearest the claim, for at least once a week for ninety days, and if at the expiration of ninety days after such notice in writing or by publication such delinquent should fail or refuse to contribute his proportion of the expenditure required by this section, his interest in the claim shall become the property of his co-owners. who have made the expenditures."

The phraseology was adopted with a view to retaining as far as possible the working of the present statutes; it doubtless could be improved. Comment on these sections and the reasons then given for the proposed amendments may be seen in the original article.

I still believe that mineral lands should be acquired and held substantially as therein stated. That the size of the claim should remain 600 ft. by 1500 ft. I believe is wise. Unquestionably the small unit, like the Mexican *pertinencia,* 100 meters square, has its advantages; and there are also points in favor of the larger location, such as 1000 ft. square in British Columbia, though the latter would better, in the United States, conform to the Land Survey units, and equal one-quarter of a quarter-section, 1320 ft. square. The idea of the original California locator that what is wanted is the vein, is, however, the point primarily of importance, and the old size of claim has the advantage of giving considerable length on the vein. It also relieves us from the confusion always connected with change. If the extralateral right is retained, it gives ample area to cover the apex, except in abnormal conditions. If the extralateral right is abolished, this area will cover the vein on its dip to a considerable depth, unless the vein be extremely flat. In the latter case, it should always be possible to locate additional ground for protection as is actually done today. Personally, I believe in the abolition of the extralateral right, but I do not intend to discuss this in the present letter.

The clause permitting location of a claim upon which no discovery of a vein in place has been made allows location for protection without the prevarication which is necessary today. The period of three years permitted for discovery allows time to follow a vein dipping outside the lines of an original adjoining location. In any event, actual discovery of rock in place should not be necessary prerequisite of valid location. A man who is willing actually to devote time to prospecting a given area should be protected while so doing. Other countries, as Nova Scotia, and Mexico prior to 1911, have recognized this and issued a prospector's license, which practically gives its recipient an option for a certain period on the ground covered.

We have thus initiated title substantially as at present. Right of possession is primarily by issue, rental being either through the performance of $100 worth of work, payment of $100 for surveys by deputy United States mineral surveyor, or payment in cash to the Land Office. Claims upon which the annual rental is not thus paid automatically become public land again and ownership is thus terminated. The advisability of passing lands to patent I question. Thousands of acres are now tied up in this way, undeveloped by the owners, closed to those who have the desire to explore them. The state of Nevada has endeavored to overcome this condition by passing a law increasing the tax on unworked patented claims, and further has declared that patented claims entered upon and occupied for a period of two years, when said claims are held and worked "in the usual and customary mode of holding and working similar claims in the vicinity," shall become the property of the man who has "jumped" them. I believe that some form of leasehold s preferable to permanently alienating the land, but this comes within the province of your queston No. 3, which I do not propose to discuss now.

George H. Playter (Joplin, Mo.).—I am heartily in sympathy with any change that will eliminate the large amount of litigation which present laws seem to make possible. My experience in the western fields has been so limited that I do not feel myself qualified to pass any opinion as to the right or wrong of the extralateral rights principle.

In the matter of the advisability of government control over all minerals, I have very decided views and believe that the present practice of withholding large bodies of mineral lands for the purpose of awaiting enhanced values should be stopped. Mining developments in the Joplin District are very much retarded because of the fact that the lands are held under patents from the Government, and a great deal of property which might be productive is not available because of high royalties. I personally am interested in both sides of the game and the greater portion of the revenues derived by the companies in which I am interested is from royalties, but there are so many instances in which the owner of the surface right obtains large rewards to which he is not entitled, and which should accrue to the benefit of the man who develops the mineral resources therein, that for the greater benefit of the industry I feel that a change should be made.

Mining rights should be absolute so long as properties are operated, and should revert to the public whenever operations have ceased. Of course, forfeitures should not be made until even more than a reasonable time had elapsed, but I am opposed to the theory of a patented mining claim, wherein title passes irrespective of whether any effort is being made to develop the property.

M. L. Requa.—(1) I do not think that classification and segregation are either practical or wise. Classification of lands in the United States could only be made approximately. I believe that the surface rights should go with the mineral. There might be conditions where this would not be necessary, but in the oil fields it certainly is almost impossible to work oil deposits without owning surface rights.

(2) I would not permit the patenting of mining ground until a discovery has been made.

(3) I would permanently alienate the lands by patent, permitting the Government to collect a small tax upon the output of all properties, if this is insisted upon by the Government. I am not in sympathy with the leasing of Government mineral lands any more than I would be with the leasing of Government agricultural lands. I doubt if there is any real reason why a special tax should be placed upon the ouput of mineral lands any more than upon the output of potatoes or corn. If it is finally decided by the Congress that Government mineral land shall be leased, the less interference upon the part of the Government the better. I would make the royalty a very small one and have as little Government interference as possible. I believe the Government could demand a standardization of accounts in justice to all concerned. The royalty, of course, whatever it is, should be a gross royalty.

(4) Extralateral rights should be abolished.

L. D. Ricketts (Cananea, Sonora, Mexico).—In any new legislation we should avoid the curse of establishing laws on opinions and vague theories, and should establish them on absolute facts. This would prevent the possibility of fraud and the possibility of titles issuing where they are not deserved, through misunderstanding of the conditions. Nowadays, most of the true fissure veins which actually outcrop have been discovered and located, and the new deposits will be largely more or less concealed deposits that do not show definite surface indications. There are many outcrops of iron-stained porphyry in the West. In most instances these are stained because the porphyry originally contained minute specks of iron pyrites but in some instances copper was associated with the iron pyrites, and in these few cases the so-called "porphyries" have found their origin. In other cases very valuable ore deposits have been found that do not even come to the surface, and in some cases they have been found where the ore-bearing formation is overlain by heavy deposits of younger rocks that are not ore bearing, and which were, in fact, deposited after the main ore deposits were formed. If these are facts, who can determine what is mineral land and what is not mineral land, and in undeveloped and unexplored territories who is going to be the judge sufficiently wise to classify mineral lands? The most competent engineers could not do it, and if this is the case, how can the more or less commercially inexperienced men whom the Government employs make such a classification?

For these and other reasons, if the Government should decide to declare ownership to the mineral rights of such public domain as it remains possessed of, it seems to me that in such classification there can be no specific definition of mineral lands, but there should be simply a tax (be it in labor or money) and a provision that as long as a man pays this tax he can hold possession of the mineral rights, as is the practice in Mexico, but he can only hold possession of such surface land as he may find necessary to work his property with the right of condemnation on the payment of assessed damages in case, in the future, he needs more room or continues exploitation of his mine.

I thoroughly believe in giving a right to the mineral only vertically underneath the surface area claimed. While there is a great deal of talk against large corporations, it must be remembered that nowadays the important mines that are being discovered and the important mines that will be located in the future will probably be very low-grade deposits that can be worked only on a very large scale and after the investment of a very large amount of capital. Unless provision is made, therefore, for large holdings, the development of these low-grade deposits will be stopped, and this matter should be kept in mind.

I believe the Mexican system, so far as metal mines are concerned, which allows the location of mineral lands, whether they are mineral or not and which separates the surface rights from the mineral rights, with provision for condemnation for mining purposes and compensation for damages, is the only proper system. So long as a man is limited, as he is in Mexico, it makes no difference to the government, and all it has to expect is that the locator pays his rent for the mineral rights, and so long as this rent is higher than it is on other classes of land, the Government has no cause for complaint.

I note complications, that I believe have now been settled, in the Warren District, where the Government was investigating the Warren Townsite Co. for locating the Townsite property on ground that showed no mineral, while at the same time they were investigating the location of ranch lands out in the valley, which were located as mineral claims, with a view to attacking the title in both instances.

Offhand, therefore, I can only say now that in any recommendations for legislation, the laws should be established on facts, and that if a man conforms to certain specific conditions he will not in that case be able to commit a fraud nor can people accuse him of committing a fraud. This is the beauty of the Mexican mineral law, and while there may be necessary modifications to meet conditions in the United States, I should say, on the whole that it should give us a viewpoint for framing a good law.

Charles H. Shamel (Seattle, Wash.).—(1) I am strongly in favor of the classification and segregation by the Government of all mineral rights from the surface rights in lands,—all lands, if possible.

(2) I am in favor of an alteration of the law to allow the initiation of possessory rights by simply staking and posting of a notice *without any recording* and *without any discovery* but with (1) reasonable limitation as to the number of claims that can be staked by one person, and (2) strict provisions that work on *each* claim must begin within a limited period, say 60 or 70 days, and be carried on substantially continuously *until a discovery is made.* There should be a further provision that after discovery, there should be some kind of an inspection or survey, or at least an affidavit as to the kind, character and size of mineral deposit, (this to be recorded), and that thereafter some kind of fairly continuous development and extraction of mineral from the claim, with an absolute forfeiture in case the same is not worked, and a provision against re-location by former holders. The present system is the worst possible for tying up mineral lands by speculative locations, and something like the above would obviate this.

(3) I favor a well thought out leasing system applied to all minerals.

(4) Although I admit the original crudeness and insufficiency of the extralateral provision, I am opposed to its change at present for (1) I believe it would only introduce additional

confusion as to titles of mineral deposits, and (2) the lack of detailed provision to meet varying conditions has been fairly well supplied by the court decisions, and any change now would mean a new outbreak of litigation. The principle itself I regard as eminently just and right. The difficulties which have arisen and are unquestionably serious, have occurred (1) from crudeness and lack of detail; and (2) from the difficulty of application to the facts of particular cases. The trouble from the first kind is substantially past. The second kind is met in all litigation involving complicated and financially important facts, and is not a valid reason for the rejection of an inherently just principle.

F. L. Sizer.—(1) Classification of government lands is of course desirable, but should be made with the co-operation of practical men, experienced in mining, not by young geologists exclusively. In the case of metal mining, I do not favor the segregation of surface rights from mineral rights, except in the case of necessary townsite privileges.

(2) Location of ground and due diligence in making a discovery are in my opinion sufficient evidence of good faith to warrant giving the locator exclusive possessory rights, but I favor the view already expressed by some, that the discovery of ore in place cannot be made a prerequisite to location, but prior classification, intelligently done, must precede. The present requirement of the law, in this respect, has resulted in evasion, contradiction, and false swearing—with finally many technically void locations. Perpetuate the right by an annual expenditure of $100 and make this certain by a requirement of inspection by some government official who shall record it, and at the end of a five-year period tender the owner of the claim a United States patent by a simpler and less expensive method than the atrocious system now in vogue; make the patent obligatory. Terminate the possessory right after the failure, for one year, to do the necessary annual work, but let it be advertised by the same official who inspects, stating that it is open to relocation and give the original owner the first right, say for 90 days, if it has lapsed through failure of a co-owner or through any circumstance not directly under his knowledge and control.

(3) I favor conveyance by a fee-simple title, rather than a leasing system, though perhaps the latter may be advisable in the case of coal, iron, and oil lands.

It is clear to my mind that the same laws cannot be justly applied to these last as to the precious metals, and herein arises the question of conservation of our national resources; monopolization should be strictly guarded against. Though not in its proper place, I would offer this observation that the number of claims which a single owner can locate cannot be limited, as subterfuge and indirection will always circumvent any such law enacted.

(4) By all means, the square location, with limiting vertical planes through all lines, should be adopted and the menace of extralateral rights litigation forever disposed of, so far as future grants are concerned. This style of location necessarily involves giving to a company, or to an individual who wishes to develop and work a large and costly proposition, the right to locate and patent a large number of claims in order to protect and cover the mineral territory which may be essential to a safe and profitable operation.

Warren D. Smith (Chief, Division of Mines, Bureau of Science, Manila, P. I.)—I think our present mining law in the United States is about as out-of-date and crude an affair as any public statute I have seen. It must have been framed either by farmers or lawyers, as no sane mining man would perpetrate such a thing on an innocent country.

(1) I am heartily in favor of classification of lands along the general lines adopted by the United States Geological Survey, and I think that the segregation by the Government of all minerals from surface rights is imperative if we wish to be fair. This very point has come up just now in the Philippine Islands and I look to no end of confusion and trouble as a result of not taking this step when our Philippine law was framed. In one of our districts, where numerous oil seeps have been discovered, certain persons have located placer claims, and now their ground is being jumped by people claiming agricultural rights, with no other purpose in view but to get this land away from the original locators and to develop it for oil for themselves.

(2) I am very strongly in favor of giving miner's licenses, as is done in Australia and Tasmania. These licenses should be granted for a year or a term of years, on certain conditions, for stated sums. There should be no stated assessment work, or if so, the miner should have the right to concentrate his assessment work where it will do the most good. In the Philippines, if an association has a number of claims adjoining one another, each year a little work must be done on each claim, and as a consequence no headway is made on any of them. These licenses should be revoked if the holder does not continue to pay his fee,

or if in the opinion of a competent government mining official he is not doing anything to develop his ground. This will discourage speculation.

(3) I am emphatically in favor of the leasing system. I am not fully decided as to whether distinction should be made between the different minerals.

(4) We do not have the extralateral rights principle in the Philippine law, and it is about the only good feature of our law. I think that principle was put in the United States law for the benefit of the lawyers rather than for any one else. From what I know of its workings, it has been one of the greatest hindrances to the mining industry in America.

I would further suggest that the offices of State Inspector of Mines either be abolished or taken out of politics.

Horace J. Stevens (Houghton, Mich.).—Before answering the four particular questions in this communication, permit me to observe that I doubt whether this is altogether the best time in which to bring this matter before Congress. The so-called "conservationists" have managed to raise hob throughout the country, and any bill introduced into the present session of Congress might suffer radical revision along more or less socialistic lines, in which case the mining industry would be damaged rather than aided by new Federal enactments. (This letter is dated December 27, 1911.—Ed.) I think I see a revulsion towards sanity on the part of the public, and it is certain that the gentlemen who call themselves "conservationists" are more or less discredited in the eyes of thinking men, and the volume of criticism is increasing; later on, it may be possible to secure Federal legislation of a sensible sort, without undergoing the present extreme danger of having the proposed bill injected full of socialism, before being enacted into law.

(1) I do not favor the classification of public lands, and segregation by the Government of all minerals from surface rights, as I think this will be the thin edge of the socialistic wedge.

(2) Regarding possessory rights, I favor a law covering this point that is as simple and easily workable as can be devised, by which prospectors will be protected in their honest efforts to develop property, but I am not especially in favor of law that permits the taking up of large areas of mineral land by men who do a merely nominal amount of annual assessment work, and whose interest in the property is limited solely to the doing of as little work as will suffice to hold title, in the hope of selling to some one with capital in the fullness of time.

(3) I am opposed most emphatically to the plan of leasing government lands, and believe that full title should be passed. I do not advocate different provisions for the different minerals and metals, but would treat everything alike.

(4) I am strongly in favor of definite boundary lines, and for future mineral claims and patents would favor giving no extralateral rights, but in the case of properties and camps already developed, the situation is such that the matter will have to be handled with extreme caution to guard the rights of present owners. I have noted with approval the side-line agreements, including forfeiture of extralateral rights, that have been made during the last ten years in Bisbee, Leadville and other Western camps. If the mine owners themselves could take up this point in earnest, it would be greatly to the interest of the American mining industry as a whole.

Benjamin B. Thayer (42 Broadway, New York).—(1) It is my opinion that lands should be classified as they are at the present time, and that there should be no segregation by the Government of minerals from surface rights.

(2) That the nature of the possessory right should be as it is at the present time; that mining rights shall be initiated as they are at the present time; likewise perpetuated and terminated as they are at the present time.

(3) That all mineral lands should be permanently alienated, with certain provisions, in that I think that precious metals should be dealt with as they are at the present time, while upon coal, iron, and petroleum, in particular, a royalty should be enacted by the Government.

(4) That the mining claim, instead of being 1,500 ft. in length by 600 ft. in width, shall be 1,500 ft. square, the underground boundaries to be determined by vertical planes projected through the side lines.

R. H. Toll (Denver, Colo.)—(1) I believe in government ownership of all mining rights, whether of gold, iron, salt, sulphur or oil.

(2) Possessory rights should be obtained by location or application for lease. They should be perpetuated by continuous operation, and the payment of minimum royalties, or by the performance of certain annual labor in the cases of mines in snowy regions, or wherever work is impracticable at certain seasons of the year.

(3) I believe that all mineral lands which are now owned by the Government, or which may revert to it through failure to perform the stipulated requirements, should be leased upon

a royalty basis. Because of the varied nature of the products of some of our mineral land there appears great difficulty in properly classifying the lands, and it seems to me it would be very unsatisfactory to make different provisions for different products, except in the matter of royalties, which need not be the same for all classes of minerals. I believe that royalties based upon the net returns, rather than upon the output, would be most satisfactory.

(4) In any case I believe in vertical boundaries.

D. A. Utter (United States Surveyor-General for Idaho, Boise, Idaho).—I have spent some years in the West and a large part of the time have been connected with the handling of mining property, either from the standpoint of the owner, the purchaser, or as a government employee in the Interior Department, and I have had an opportunity to see and understand the question from all points of view.

(1) If all mineral lands stood out prominently like an immense forest, it would be an easy matter for government officers to recommend segregation of certain tracts covering these lands, but in my experience, I have found that it requires years of patient toil on the part of prospectors and mining men to demonstrate whether a property or a district is of enough commercial value to justify its working as mineral land. If any considerable impediment were placed in the way of this examination and preliminary work, I can assure you that there would be but very little work done, and many valuable mining properties would never come to light. There are, however, certain classes of mineral lands that could be differently handled, which will be taken up in answer to question 3.

(2) Mining rights should be initiated by discovery and proper notice given to the world in some form, so that all parties can know the desire and intent of the discoverer. This right should be perpetuated by a zealous persistent working of the property for the purpose of developing it into a mine. The amount of work performed should be placed as a minimum, at not less than what one man could do in a year. If the discoverer, through any fault of his, should abandon the property for six months, unless it be on account of sickness, his rights should terminate. The law, in my opinion, is too elastic as to perpetuation and termination, and there is no doubt that it should be so administered as to make its real meaning more clear.

(3) I believe that a different method should be adopted for the handling of the precious metals, as compared with coal, iron, petroleum, phosphate, etc. I have stated in my answer to ques-

tion 1 that the public domain should, in my opinion, be left as open as possible for the prospector, that the Government should give to him every right that he now possesses, and that those rights should be more clearly defined with respect to the precious metals. On the other hand, such minerals as coal, iron, petroleum, lime, gypsum, and phosphate are of such character that to a geologist there is little question as to their location; hence it would not be difficult for the Government to put trained men in the field and lay out, to a reasonable extent, the area covered by such deposits, and withdraw them from mineral entry, and either work or lease these deposits, as might be determined from further and more careful investigation.

(4) I would certainly recommend that the present system of alienation of title be not retained, and that one of the most just and equitable principles of mining laws is that of the extralateral right.

Arthur H. Wethey.—(1) The present system of classification into agricultural, desert, quartz mining, placer mining, etc., appears to designate all the different classes with sufficient clearness. All patents issued by the United States should convey the entire ownership except that reservations might be made for highways, irrigation ditches, etc.

(2) The patents issued by the Government should convey absolute title, which could not be questioned, unless within five years of the issuance of the patent, fraud could be proved in acquiring the land.

(3) The system hitherto in vogue has proved satisfactory up to the present time. No ultimate advantage is to be gained by changing it. The price paid the Government for the land varies according to the classification, and this might well continue. The only suggestion I might offer is that the Government might require that the product should be sold at a reasonable price so that no monopoly or restraint of trade may result.

(4) The extralateral rights principle has been a most fruitful source of litigation. In future patents it would be well to increase the area of quartz claims and restrict ownership to the mineral beneath the surface. Extralateral rights privileges already granted by existing patents must, of course, be recognized.

My views on the advisability of continuing the present method of giving titles to minerals under the surface granted to settlers, locators, and others, are based on my experience with the government timber policy in Montana. Prior to the establishment of forest reserves there, standing timber was acquired under stone and timber entries from the United States on a basis of stumpage equal to less than 50c. per 1,000 ft. Railroad lands and timber were sold on the basis of 50c. per 1,000 ft. stumpage. The formation of reserves prevents the securing of stumpage at these low figures; the Government now requires a rate of stumpage of over $4 per 1,000 ft. This policy has greatly enhanced the value of stumpage held by large corporations, and the cost of lumber to small consumers has risen proportionately. If now the Government should reserve all the remaining minerals in the West, not already released by patent to other parties, and enforce a royalty on all minerals extracted, it would result in enhancing the value of property owned by individuals and corporations, and raise the cost of all minerals to the consumer.

Rush J. White (Federal Mining and Smelting Co., Wallace, Idaho.)—I have not attempted to discuss non-metallic mineral lands, because I do not know anything about the conditions, but I am glad to offer the following suggestions as to metallic mineral lands.

Mineral lands shall be subject to location under two heads, metallic and non-metallic mineral lands. Metallic mineral lands to embrace all lands containing deposits of metals or metallic minerals of all kinds, including placer deposits.

Metallic mineral lands to be subject to location as mining claims by citizens, or associations of citizens of the United States, or those who have declared their intention to become such, or by mining corporations through their duly authorized agent. The size of a mining claim may be up to 1,500 ft. square, underground boundaries to be surface boundaries projected vertically downward.

Title to be initiated by staking the claim and properly posting and recording the notice of location (not necessarily making a "discovery" of valuable mineral). Title to be perpetuated, before issuance of grant from the United States, by doing at least $250 worth of work in each calendar year, including the year of location, for each claim located, or in case of location so late in the year that it is impossible to do $250 worth of beneficial work before the end of the calendar year, then $500 worth of work for each claim shall be done before the end of the succeeding year.

One individual, association, or corporation may locate or acquire by purchase and hold title to, at any one time, not to exceed 2,000 acres of mineral land in any one mining district, and not to exceed 10,000 acres of mineral land all told. This does not, however, preclude any individual, association, or corporation from holding or owning any necessary amount of surface ground for plant, reduction works, refuse disposal, protection against tailings or "smoke farmers", etc.

Underground rights shall be held under title separate from that to the surface rights.

The United States shall not give an absolute patent to mineral deposits, but the title shall be in the nature of a transferable grant that shall revert to the Government after the mineral deposit has been worked out, or after the lapse of a certain length of time in which due diligence has not been shown in working or exploring the deposit. Failure to find a mineral deposit shall not operate to terminate the grant, provided diligence in exploration be shown.

Title to surface ground shall be given by patent, and shall be absolute and for all time.

In the case of mining claims located on government land, the mineral claimant shall have the preference over others in obtaining title to the surface above his mineral holdings. Adequate provisions shall be made for obtaining title to ample government land for tunnels through non-mineral ground, for plant, reduction works, refuse disposal, etc.

The Government shall not lease its mineral lands, either metallic or non-metallic, and shall not collect any royalty. (Taxes, and the expenses and risks incidental to exploration and development, are sufficient burden upon legitimate mining.)

Provision to be made for free timber, prior to the time the property becomes self-sustaining, for mining use, necessary roads, bridges, etc.

Patents to agricultural and other lands permanently alienated previous to the approval of this proposed act shall be declared to carry title to mineral deposits of all kinds within the surface boundaries projected vertically downward.

It should not be necessary in obtaining grant for mineral land under this proposed act to submit it to the examination of a special agent of the Government for the reason that this act should not presume actual development of mineral values, as prerequisite to obtaining title, and for the further reason that failure diligently to prosecute operations will automatically terminate the grant. A proper function of the government agent or inspector would be the determination as to whether operations were diligently prosecuted or not.

It should be very clear that the $250 worth of assessment work required in each year before the issuance of grant need not actually be on the claim for which the work is done, but may be done at any point where it will develop the group of claims as a whole. Similarly, diligent prosecution of operations should apply to the group of claims as a whole and not to any individual claim.

PERSONALS

J. C. Branner has been made president of Stanford University, succeeding Dr. David Starr Jordan, who has resigned to accept the office of Chancellor.

The American Geographical Society has conferred its Charles P. Daly gold medal upon Dr. Alfred H. Brooks for his geological and geographical work in Alaska.

R. C. Gemmell has become general manager of the Utah Copper Co., succeeding D. C. Jackling, who is now vice-president and managing director.

F. Lynwood Garrison has returned to Philadelphia from Colombia. He is no longer connected with the Breitung interests.

Louis D. Huntoon has become Eastern representative of the Stearns-Roger Manufacturing Co., of Denver, Colo., with office at 115 Broadway, New York. Mr. Huntoon will also continue his consulting practice.

R. V. Norris gave a series of three lectures at Columbia School of Mines in February on the methods and plant for ventilating coal mines, a subject on which he rates as an expert. In March he gave another series of four lectures, two on mine drainage, by pumping and hoisting, and two on power plants for collieries.

Forbes Rickard, formerly general manager and consulting engineer for the Valdez Creek Placer Mines in Alaska, has severed his connection with that company.

Reno H. Sales has been elected vice-president of the Montana Society of Engineers. George A. Packard is one of the trustees of the same organization.

F. F. Sharpless gave a talk on Colombia before the Mining Society of Yale University on May 3.

L. D. Huntoon has been elected chairman of the New York section of the American Institute of Mining Engineers; A. S. Dwight is vice-chairman, and T. T. Read is secretary.

F. A. Hill is general manager of coal mines for Madeira, Hill & Co., of Philadelphia. This company operates in the anthracite and bituminous coal fields of Pennsylvania.

Professor J. F. Kemp lectured on the Catskill Aqueduct of New York and the application of geology to great engineering enterprises, at the Pennsylvania State College on Feb. 25. After the lecture a banquet was tendered Dr. Kemp by the Research Club, consisting of the local members of the Sigma Xi.

George S. Rice presented a paper on "European Mining Practice, especially the Methods of Hydraulic Filling or Flushing of Mines" before the New York section of the American Institute of Mining Engineers on March 21.

CHANGES IN ADDRESS

Beeler, H. C........................127 15th St., Denver, Colo.
Huntoon, Louis D..................115 Broadway, New York
Kimball, E. B.............284 Mountain Ave., Piedmont, Cal.
Merrill, C. W...............121 Second St., San Francisco, Cal.
Read, Thos. T..............1308 Woolworth Bldg., New York
Shockley, W. H........c/o First Nat. Bank, San Francisco, Cal.
Sizer, F. L.......915 First Nat. Bank Bldg., San Francisco, Cal.
Waterman, Douglas..............c/o Butters Divisadero Co.,
Divisadero, Salvador, C. A.

MEMBERS ELECTED IN APRIL, 1913

Ropp, Alfred von der...............233 Broadway, New York
Representative, Cons. Gold Fields of South Africa, Ltd.;
also Mgr., Gold Fields American Development
Co., Ltd.
Whitaker, Orvil Robert.....932 Equitable Bldg., Denver, Colo.
Consulting Engineer of Mines.
Wilkins, H. A. J..........142 East Eighteenth St., New York
Pres., Mines Management Co.

MEMBERS ELECTED IN MAY, 1913

DeSaulles, C. A. H..................165 Broadway, New York
Vice-Pres. and Gen. Mgr., U. S. Zinc Co.; Met. Engr.,
American Smelting & Refining Co.
Hardinge, H. W....................50 Church St., New York
Consulting Mining and Metallurgical Engineer.

Mining and Metallurgical Society of America

Vol. VI. July 31, 1913. No. 7.

ANNOUNCEMENTS.

Report of Committee on Mining Law.—The remainder of the reports and letters received by the Committee on Mining Law, and submitted with its report, are published in this issue.

Bound Volumes.—Bound volumes of the bulletin of the Society for 1912 may be obtained from the Secretary for the price of $1.50. Any member desiring a complete set of the bulletins for 1912 unbound can obtain it, free of charge, by application to the Secretary. Volume IV (1911) may be obtained at the same price, but no complete sets of bulletins published prior to 1911 are now available.

San Francisco Section.—Meetings of the San Francisco section are scheduled for the first Monday of September and of December, 1913. Other meetings may be held on call of the chairman.

New York Section.—The first meeting of the New York section for the year 1913-1914 will be held in September.

Council.—No meeting of the council of the Society has recently been held owing to the absence of so many members from New York, which has made it impossible to secure a quorum.

Annual Medal.—Members are urged to send promptly to the Secretary their recommendations for the award of the annual medal of the Society.

M. M. S. A. and A. I. M. E.—The plan of union of the Society and the Institute is in abeyance, pending action on the part of the Institute.

W. R. Ingalls.
Secretary.

COMMUNICATIONS

The following reports and letters were received by the Committee on Mining Law in response to its letter asking for opinions of members and others. The first instalments of the replies were published in Bulletin Nos. 60 and 61:—

OFFICIAL OPINIONS OF OTHER ORGANIZATIONS.

(Report of the Committee of the American Mining Congress on General Revision of the Mineral Land Laws. Contributed by E. B. Kirby, Chairman.)

This committee has assigned to it the work of securing action from the Congress of the United States, upon the request of the American Mining Congress for a general revision of the mineral land laws. By the time the list of committee members had been appointed and had conferred and agreed upon their plans, the winter session of Congress was so near its close that it was found that no effective action was then possible. During the special summer session there was a general understanding in the House and Senate that no general legislation was to be introduced, and this understanding prevented the consideration of our measure. It was, therefore, decided to undertake it early in the regular session this winter, at which time a joint resolution on the following lines was introduced through our friends in Congress:

> That .... Committee .... is instructed to prepare and submit at this session a mode of procedure whereby Congress may undertake a general revision of the Mineral Land Laws of the United States in the way which will best promote the public welfare and meet the peculiar needs of the mining industry. The plan recommended should provide a practical means whereby Congress may utilize the best experience and judgment available in the industry, and which will give the mining regions of the United States and Alaska ample opportunity for public hearings and the discussion of remedies.

In the meantime, this committee has taken up the matter with the governors and the United States senators and representatives of the Western states and territories affected. It has informed them of the request of the American Mining Congress for a general revision and its reasons therefor, and of the aforesaid joint resolution. The replies show that in this undertaking the American Mining Congress not only has no opposition, but has the general approval and support of the public men of Western states, while a number of them show a keen personal interest in the matter. It is clear that, with the support promised and the non-partisan nature of the measure, there will be effective action by Congress at the next session.

After Congress has empowered some committee to act, this committee hopes to have the opportunity of presenting to it such detailed information and suggestions as may aid in preparing a plan whether for a Commission or otherwise, which will be satisfactory to Congress and accomplish the ends desired. This committee believes that this may be secured through a wisely selected Commission, authorized to draft a revised code for the use of Congress. This Commission should hold public hearings in the principal mining centers of the West and Alaska. It should call before it men prominent for their knowledge of prospecting, of claim locations, of mine operating, mine litigation, and the history of mining laws, and should invite opinions from the public, bearing upon the specific points at issue. The authorities and experience of other mining countries should also be consulted and the recommendations of the commission should be presented in the form of a fully drafted code.

It is clear that there is a best practical solution for each one of the difficult problems involved in a general revision of the mining land laws, but in order to determine these best solutions, all opinions must be brought to a focus before some authoritative body which has the power of decision. Moreover, in order to assure the general approval and acceptance of reforms affecting so many varied interests, the personnel of this body should be such as to command confidence, and the mining communities should have opportunities to present their views before it. There is a wealth of learning and practical experience in the country, which is available for the work of framing a revised code, but it is distributed among many men and must be focused by the plan indicated.

In order properly to follow up the business now under way, this committee asks that it be authorized to continue its work during the coming year. The following memorandum explains the request of the American Mining Congress for revision, and the reasons for its action.

Memorandum.

The American Mining Congress, representing the mining industry of the United States and Alaska, asks that Congress shall undertake a general revision of the mineral land laws.

Imperfections of the Present Laws.—The mineral land laws of the United States and Alaska, framed in 1872, and interwoven with a mass of supplementary state legislation, differing in every state, fail to meet the present requirements of the industry. Moreover, they have developed various evils, the injurious effects of which are steadily increasing. These have become so serious as to retard the development of mining and to create dissatisfaction and complaint everywhere.

At every annual session of the American Mining Congress during the past 12 years the prevailing discontent with the present code has been voiced by various resolutions calling attention to the evils and asking for the correction of this or that feature of the laws relating to mineral claims located upon the public domain. Such complaints steadily increasing in volume have found expression not only in the Mining Congress, but also in the press of the mining communities, all the mining journals, in the societies of mining engineers, and in fact through every medium available for the expression of public sentiment. They have nevertheless been without results for the reason that the mining laws are largely interdependent and it is difficult, if not impossible, to correct one fault without straightening out the entire code. Moreover, the states affected, some of which have often attempted to make improvements, find that nothing effective can be done without the action of Congress. In short, patchwork is impossible and a general revision is necessary.

Difficulties of the Work.—Since the problems involved in the work are peculiar to the industry and are unusually difficult, it is evident that their satisfactory solution will require the aid of the most experienced judgment, together with a free and direct expression of views by the mining communities themselves. Among the many questions which will arise during a revision are the following, which will illustrate the nature of the work.

Some of the Problems.—The apex law, with the uncertainties of title and litigation caused by it. The latter includes not only the conflicts caused by the extralateral right, but also those occasioned by the consequent shapes of claims and the overlapping of lines.

The creation of a definite procedure for acquiring rights to those claims in which the mineral is not near the surface, and where discovery must in consequence be long deferred.

Tunnel locations and the uncertainties of title caused by them in neighboring claims.

The present non-observance of the law of discovery.

The partial or complete non-observance, through various expedients, of the law of assessment.

The location of an unlimited number of claims by one individual.

Location by proxy.

Reasons for Revision Now.—A general revision now will be particularly timely because of public interest in conservation and the new legislation now under consideration for timber, oil, phosphate, and coal lands, and also power sites. To omit the "Mining Code" from any program for the betterment of laws relating to natural resources, would be to pass by the field where relief is most urgently needed.

Montana Society of Engineers, Butte, Montana.

The committee on recommendations in connection with the proposed or suggested revision of the mining laws of the United States, appointed on January 13, 1912, begs to submit for your consideration the following report, the same being a revision and amendment by the society of an original report submitted at its special meeting on February 3, 1912:

(1) We are opposed to the classification of the remaining public lands, not so much on account of the principle, as the impracticability of the same, as thoroughly demonstrated by the present classifications of the lands included within the Northern Pacific and other railroad grants, under which classifications some of the best mineral lands in this and other districts have been patented to the said railroads and are forever withdrawn from development by the prospector and miner.

The current stories of the methods of the board of examiners who made this classification, if true, point to the absurdity of such a proceeding, and the same influences which were brought to bear upon this board might easily be exerted in any such proceedings in the future as they were in the past, to the benefit of the influential individual as against the good of the public.

We are opposed to the segregation of all surface and mineral rights, but are in favor of excepting all mineral from agricultural, timber and stone entries.

(2) The committee would suggest that the present laws governing matters involved under this question are, in principle, very satisfactory. The qualifications for ownership, or initiation of a mining right, are fully covered by the present requirement, "a citizen, or one who has declared his intention of becoming such citizen." A mining right should be initiated by a discovery of mineral, and the courts have defined a valid "discovery" under our present laws, which definition seems to us to be perfectly fair. The right shall be perpetuated by the performance of $100 worth of work annually, for each claim; the affidavit of assessment work shall specify the nature of the work performed, the locality at which the work was performed, and the filing of said affidavit shall be obligatory. The right shall

terminate upon the failure of the claimant to comply with the above requirements.

We feel that the present requirement of $500 worth of work for the obtaining of a patent is sufficient.

The committee recommends a provision for the protected exploration of lands which are mineral in character, but which cannot be legally located under the present law.

The committee, in the way of explanation, also desires to state its position more fully in the matter of requirements. The history of mining shows that the industry has its inception and being from the efforts of the prospector and pioneer, who are generally, if not always, men of small means, who depend upon their physical efforts for the discovery of the precious mineral bearing veins to bring to them a reward in the form of money from the investor. If the reward is large enough he then ceases to be a prospector, and his share in the development of our mineral resources is left to his brothers of the pick and pan. Very few of the present big mines of our country have ever arrived at the producing stage under the ownership of the original locator, for the reason that he is seldom, if ever, in a position financially to develop his property.

We would suggest, in considering any proposed changes in the present requirements, that the burden upon the prospector for the perpetuation of his rights, as against third parties, be not increased, for the reason that any one who is willing to invest his time, his health, and his money, for the development of the mineral resources of our country should not be hampered with an overburden of restrictions, and should be encouraged with the knowledge that what he finds and develops can be easily acquired as a reward for his efforts.

(3) We strongly recommend that mineral lands shall be permanently alienated, and do not feel that our position in this matter needs any explanation. The wealth of our country as derived from our mineral resources does not favorably compare with the wealth derived from our agricultural resources; yet there has never been, and is not at the present time, any question as to the permanent alienation of our agricultural lands.

We recommend that certain specific provisions be made regarding coal, iron ore, and petroleum, and other minerals, as distinguished from the present provisions regarding the precious metals. The conditions surrounding their existence, and the ease with which their approximate extent and value can be estimated, are much different from those surrounding the so-called precious metals. The acquisition, or right to develop, petroleum lands in particular should be especially provided for, as the conditions surrounding the discovery and production of this mineral are entirely different from all others.

We would also suggest that some provision should be made for the development and acquisition of mineral which has been or will be segregated from the surface ownership, notably illustrated by the mineral which the Government withheld in its deeds to the Northern Pacific Railroad, but which cannot be acquired by any one else without trespass.

(4) We would recommend that the area of mining claims be increased, and that the ownership of the mineral be limited by vertical end and side planes.

In conclusion, we have a suggestion to make concerning the administration of the Public Land Laws:

At the present time all decisions relating to our public lands, mineral and otherwise, come from the Secretary of the Interior, *from which there is no appeal.* To make for better enforcement of the present laws, or any addition to or changes thereof, we heartily recommend the establishment of a Land Office Court, the same to be organized along identical lines with the recently established Commerce Court, this court to be a court of appeal from the decisions of the Interior Department, and a court of last resort.

SAMUEL BARKER, JR., *Chairman,*
F. W. C. WHYTE,
ROBERT H. LINDSAY, JR.,
B. H. DUNSHEE,
Committee.

Report of the Committee on Mines of the Alaska Bureau of the Seattle Chamber of Commerce, contributed by Maurice D. Leehey, Chairman.

I deem it well to give you a statement of our ideas, upon which we are practically unanimous. We are opposed to undertaking a general revision of our mineral laws at this time because we feel that present public opinion is wrong. The misinformation disseminated under the direction of Mr. Pinchot, and the articles of the muckrakers have misled the American public into believing that our public land system has been a failure, instead of being a grander success than any other piece of legislation of equal importance ever enacted. It is true that the system is not perfect, and it is also true that we should constantly seek to remedy any existing defects, but we doubt the advisability of undertaking this at this time. Let us rather devote ourselves in a systematic way to inform the public.

(1) The classification of lands is being directed by the

Government about as well as can be expected under existing conditions. I refer to the inflamed condition of public opinion and its effects upon the bureaucrats in Washington, some of whom have been active in the actual dissemination of falsehoods, and others are so timid that they are simply trying to catch the popular notion.

(2) We are opposed to any change in the nature of the possessory right acquired under present mineral location. Mining rights should be initiated as at present. It would be well, however, to impose more severe conditions as necessary to perpetuate such rights and to require that application be made for patent with a limited number of years. Most of the public-land states, however, require the sinking of a shaft, or other work which will cost about $100, within 90 days after location This protects those states from the evils of wholesale staking, which is a great curse in Alaska where only the Federal law operates, and "pencil locators" have been known to tie up whole creeks for practically two years without making any improvements.

(3) We are opposed to leasing mineral lands, primarily because it would discourage the prospector. We need him to uncover the orebodies, and he must be able to sell something when he finds it. He cannot even obtain a grubstake to hunt for a lease. We are also opposed to the leasing of coal lands, but admit that our great objection to the leasing of metal mineral lands does not apply to coal lands. Coal exposures will be discovered without the aid of the prospector as settlement progresses and the demand for fuel arises. We are opposed to the leasing of all mineral lands, however, because we believe it will discourage competition, tend to monopoly, thus discouraging economical mining, and even lead to wasteful mining.

(4) The extralateral rights principle is just, in theory at least. Any new law will require interpretation by the courts. The present law has been very thoroughly interpreted by the courts during the last 40 years, so that now any lawyer in possession of the facts may pretty accurately advise his client. It is true that the law of extralateral rights presents complications where it is practically impossible to obtain a knowledge of the facts, but I see as many complications which may arise if the law be changed as if it be continued.

EXPERIENCE OF FOREIGN COUNTRIES.

Canada.

G. G. S. Lindsay (Toronto, Ontario).—Your letter of November 27 to Professor Willet G. Miller, Provincial Mineralogist of Ontario, has been handed over by him to me, with the request that I write you upon the subject of your communication.

I am chairman of the committee appointed by the Canadian Mining Institute, at the instance of the Dominion Government, to assist in drafting a mining law referable to so much of the public domain of Canada as is under the jurisdiction of the Dominion Government, in so far as the mineral resources are concerned. In part of British Columbia, in the provinces of Alberta, Saskatchewan and Manitoba, and in all the great northern unorganized country, the lands undisposed of belong to the Crown, as represented by the Dominion of Canada. We have drafted a statute, which has, however, not yet been finally revised, although printed, and are about to give it our final consideration, when some matters of form but not matters of substance may be amended.

We hope by getting the Dominion Government to adopt a satisfactory act respecting mining that it may be followed by the various provinces that have charge of their own minerals, and in this way bring about a uniformity all over the Dominion, which is a thing entirely to be desired.

On such questions as "the right of the Government of the United States to the precious metals which it has never waived," that would seem to be contrary to every principle of our law where a grant in fee of the land carries everything that is not reserved. This is not one "of the colonies in which the government has under similar circumstances resumed the jurisdiction over patented land and the minerals contained therein." In Ontario a small tax has been imposed upon mineral lands, when, if not paid, these have been liable to sale for taxes. Of course, I am not aware of the force of the statement made that the Government's policy with you "in the fifties and sixties required the reservation of all mines and mineral lands to the Government." If that were the statute law as to agriculture grants at the time, it might not be beyond the power, or indeed outside the moral right of the Government, now to reform all deeds issued since that time so as to read into them what was the statute requirement at that time, but not put into the patents by those officers who issued the land grants.

I should add that our reason for adopting the lease system as against the patent of the fee is that such a document gives the state some continuing interest in the property disposed of, and at the same time prevents large tracts of land from being tied up and nothing done on them for a long period. If people have rental to pay and have really made up their minds that they do not care to go on with actual mining, they will probably drop the payments and the lands in this way will go to the Crown.

The people of this country are adverse to complete alienation of mineral rights without some assurance that they will be worked, and to allowing mineral claims to be tied up for long periods of time without any requirement as to work being done.

John E. Hardman (Montreal, Canada).—(1) In almost all the provinces of Canada (and in most of the English colonies) there are three equities in every parcel of land; in Canada these are: (*a*) timber rights; (*b*) agrarian or farmer's rights for the cultivation of the soil; and (*c*) mining rights, of the minerals contained beneath the soil.

There is a distinct pronouncement in our laws that these three separate rights are separate entities and properties. It is not uncommon to find these three rights held by three different individuals or corporations, and also it is common to find all three equities held and owned by one individual or corporation. As you may know, the English law proceeds on the ancient basis that the precious metals (and other minerals) belong to the Crown, but in the case of the North American colonies a special act was passed in 1829 whereby the royal rights were forever granted, first to the Duke of Kent, and subsequently by him to the then different provinces of Canada; so that the royalties which are collected in the different provinces go into the Provincial Exchequers and not to the Dominion Government. Nova Scotia is the principal province which has profited from this, and her revenues from royalties on coal and other minerals range from $400,000 to $500,000 a year; the British Columbia royalties I am unable to speak of exactly. The Ontario law contains the provision that royalties shall not be imposed upon producing mines for from three to seven years, and of course are never imposed upon mines that are not producing.

Our condition in Canada is peculiar, inasmuch as almost all of the provinces have valuable growths of forests which have been productive of large revenues to the provincial governments through the sale of rights to cut timber on government land.

If a miner in the new districts of Ontario (such as Porcupine) discovers what he deems a valuable deposit of ore, he proceeds, according to the direction of the mining law, and stakes out his property, but he thereby acquires no right to the standing valuable timber other than what may be deemed sufficient by the mining inspector for the construction of his log huts and other buildings. The right to acquire the timber upon that location (and in every part of the country) is entirely separate, and these rights are usually put up annually by the provinces and disposed of by auction to the highest bidder, who is usually a timber company.

In regard to the farmer's privileges, or agrarian rights, he is not permitted to take up a forest section, cut off the timber and destroy it without first paying the Government the stumpage due on that timber, and, in consequence, the farmer rarely undertakes to acquire any land on which valuable timber exists; he prefers rather to take up his land after the lumber man has been over it and culled all the valuable timber from it.

If, now, the prospector comes along *after* the lumber man has finished, and *after* the farmer has acquired his agrarian rights, he can obtain the mining rights beneath that farm by due process of the mining law, but he is required, in most provinces, to enter into a bond, or a guarantee, satisfactory to the farmer, either (*a*) to damage no cultivated land, or (*b*) to pay for such cultivated land as he may damage; the price to be agreed upon between himself and the farmer, or, in the event of their disagreeing, to be determined by three arbitrators. That is supposed to be the smooth course of the law, but as a matter of practice, the miner destroys large quantities of valuable timber, is cursed by the lumberman and rarely makes any compensation to the farmer. These last remarks apply, of course, to the new and comparatively virgin parts of the country. In the older and settled portions of all of our provinces, before the miner can commence to dig and exploit his vein, he is required to enter into an agreement with the farmer, and to have that agreement duly recorded, wherein he undertakes to pay fitting damages for such portion of the land as he may occupy. In practice, this works out that if a miner finds a valuable deposit, the agrarian rights of the farmer are purchased completely by the operator.

Now, the application of this law to most of the United States (with which I am pretty familiar) would be quite unnecessary as it is an uncommon thing to find valuable mineral deposits upon any ranch located by the Western farmer, and it is equally rare to find valuable timber upon claims in the far West; but the question of mineral rights and timber rights would come in very largely in some of the Southern states, notably Georgia and Alabama, and also in sections of Minnesota, Michigan and Wisconsin. If a personal opinion is desired, it seems to me most desirable that the Government should segregate the minerals from the other equities in the land, and should protect each equity to the fullest extent possible.

(2 and 3) A discussion of the nature of the possessory rights, and how mining rights should be initiated, continued, and terminated, really involves consideration of your second and third paragraphs together, as to whether the mining rights should be permanently disposed of, or whether they should be held only under lease. I do not care to discuss this paragraph very much, as it seems to me rather impossible to convey adequately one's views in a letter. I mean that experience with lease-hold titles (under which mineral properties are held in Nova Scotia) has been often very vexatious, and, at times, even burdensome to the mine operator. A lease-hold title involves a consideration for the lease, whether it be in the nature of a royalty or a big lump sum, and there is no doubt in my own mind that many promising sections of country which I have seen have been delayed in their development, and, in fact, are some of them today undeveloped, by reason of the lease-hold restrictions. It therefore seems that it would be much better for the miner to have the mineral lands permanently alienated and direct title given to him. In my experience of 30-odd years I have known of no mining law or code which is so satisfactory, alike to the prospector and to the large mine owner, as the mining law of Mexico, which as you probably know, is substantially the new Spanish code. Under this law a man stakes his ground, monuments it with stone monuments, and then pays to the national government in the form of three equal payments each year, a sum calculated upon the number of hectares in his claim. This rental or tax is uniform throughout the Republic. So long as these payments are made to the proper officer within the time specified by law, the title to such mining property in Mexico is absolute and cannot be varied. The government derives a certain revenue from this tax which is imposed upon each *pertenencia;* it is immaterial whether the claim is worked or idle, it is immaterial whether the claim is rich or poor; it is, if you like, a lease-hold, but so long as the owner pays to the government what may be called his "rental" and pays it *when it is due,* his title is indefeasible.

Personally I strongly advocate different provisions in the law for the different minerals; I think it would be unfair to all parties to prescribe absolutely similar conditions for the acquisition of a gold quartz mine, a horizontal bed of coal, a steeply inclined bed of iron ore, and the various other minerals of commercial value.

(4) To keep the extralateral right any longer in the statute books of the United States would be a crime; in my personal opin-

ion, and in consequence of my Colorado experience, I regard the insertion of the maintenance of the extralateral rights principle a blot on the civilization of the United States and I have no hesitation whatsoever in saying that *that* feature of the American law should be abolished absolutely and forever. In this connection I would strongly advocate that all mining claims should be bounded by vertical planes passing through their side and end lines, and that no trespass beyond such vertical plane be permitted. I need not tell you, nor any mining man in the United States, how exceedingly costly this extralateral right has been to both capitalists and claim owners.

If your committee is going to suggest to the Government a new mining act for the United States I think it is especially desirable that they should make it as simple as possible. During the last five or six years the government of Ontario (since discovery of the Cobalt field) has made one or two attempts to amend or modify its existing mining laws, but they have made a horrible hash of the whole matter, and their present law cannot be considered by any means as a model; neither can that of any other Canadian province. Probably the best mining law in Canada is that of British Columbia. There are many sections of that British Columbia law which could be amended with great advantage both to the prospector and to the mine operator. It seems to me of great importance that in any mining law which may be framed by your committee, due protection should be given to the prospector as well as to the capitalist. I do not mean that any man should be prohibited to go out into the hills and stake out any piece of ground that he likes without regard to whether it is mineral-bearing or not, but I mean that if he *does* stake that ground he should be made to pay for it if he holds it, and I think that the Spanish (or Mexican) method is far better than that of insisting upon so many day's work for each year.

I think that a permanent title, based upon an annual contribution to the Government of a fixed rental, is a very desirable feature, more desirable perhaps than an absolute title in fee simple, inasmuch as it tends to prevent the tying up of mineral property in the hands of the owners who will not develop it; if they refuse to develop it they are obliged to spend money on it to retain their title, and there are very few men, even large capitalists, who will continue to pay rental for properties that are not being utilized.

F. A. Ross (Spokane, Wash.).—Limiting myself to gold, silver, copper, lead, and zinc, to which my United States, Mexican and Canadian experience of 20 years has been confined, I beg to offer the following suggestions in accordance with my convictions:

For many years I have believed that, with certain amendments and minor qualifications, the mining laws of British Columbia have been drawn very comprehensively, and that they are competent to protect the best interests of both individual and state.

For instance, the revocable "Miner's License" is a most excellent device—not only for the purposes of raising funds for internal improvements and of impressing upon individual and corporation alike a due sense of personal dignity and responsibility, but also for strengthening and perpetuating governmental supervision and control. The threat of loss of this precious privilege has done much to keep individual and corporation to the straight and narrow path.

But most important of all is the "square location"—*without extralateral rights*—by which is removed the most fruitful source of United States mining litigation and its attendant evils.

Next in importance is the need of legislation aimed at the wholesale retirement of mineral lands by those seeking monopoly, or who are bent upon speculation. All land not actually and continuously worked (within reasonable limits) should revert and be open to location or re-location. Even British Columbia statutes are defective on this point, since they fail in practice to check prevalent and gross misrepresentation as to annual assessment work done, or work necessary to a Crown grant. Consequently, immense mineral areas lie unprospected for long periods in both United States and Canada. The penalties for such misrepresentation should be very severe and should apply to government officers as well as to owners.

Moreover, failure to work promising ground for stated periods should work forfeiture and reversion, subject, of course, to the owner's defense at a proper hearing and with proper provision for compensation for valuable improvements in case forfeiture is declared and possessory right passes. This would be tantamount to a system of leasing mineral rights, in place of permanent alienation of title, yet the practical result would be beneficial to the State inasmuch as a thorough exploitation of the ground would be made possible and monopoly be prevented. Under such a system I should propose a reasonable tax or royalty, payable to the State (as in British Columbia) with this difference, that there should be but one levy and that one upon the *gross* value of all ore actually milled, smelted or otherwise reduced, as shown by compulsory mill, smelter or shipping records (*not* mine records) in which all ores have been *weighed* and not estimated. No additional tax should be levied upon net profits (as in British Columbia) since this operates as a double tax and places a premium upon dishonesty.

The segregation of mineral rights from surface rights works well in British Columbia and the statutes governing titles under this classification appear fair to all; yet, having proposed a system of leasing mineral rights, it would be necessary to make provision for damages to surface owners caused by mining operations and to guarantee surface owners the prior right to lease minerals discovered on their lands; also, to guarantee owners of mineral rights the prior right to purchase surface rights, both in case of conflicts. In this way, surface rights might be alienated permanently so that title thereto might pass. Timber rights and mining and water rights should be safeguarded to individual and state as in British Columbia.

In the matter of original locations, our own statutes appear adequate on the whole, requiring, as they do, a bona fide discovery of mineral and the performance of certain work prior to recording.

Germany.

Karl Eilers, (American Smelting and Refining Co., New York).—I had occasion some time ago to look over the mining laws in Germany, and was surprised to find there that the title to the mineral below the soil did not belong to the owner of the soil. Apparently if anyone suspects mineral under ground he can arrange by proper payment to the owner to prospect for this mineral, and if he finds it he can get a right from the government to mine this particular mineral, apparently so long as he pays certain taxes. The right to mine this mineral, however, does not give to the miners or mining company the right to all the ground above and below him; for if it is found that above or below the point where he is mining his ore there is some other ore or mineral, and if some other person, a third party, wants to mine this different mineral, the first miner must make up his mind whether he wants to take out that additional mineral. Upon the lapse of a certain time he loses his first right, and the third party then obtains the right from the government to mine for the additional mineral. The size of the mining claim is apparently not limited in any way, except at the option of the miner and his ability to conform to the tax requirements of the government.

The above laws seem to apply to every sort of mineral except salt and coal, especially coal. Within the last three years the government seems to have prohibited any new mining of coal, apparently with the same idea as our conservationists.

Mexico.

Maurice Codwell (Chihuahua, Mex.).—In regard to the very interesting questions which you bring up on the subject of the United States mining laws, I would suggest that the laws as set forth by the Mexican Government be given consideration. I have been in the country for many years, and have had occasion to study, not only the very old titles governing mining claims, but also those of recent date, and excepting the differences arising from questions relating to ownership, due to complicated transfers, and "avio" contracts, together with errors in surveys, there is little to find fault with in the wording of the Mexican laws. I consider one very strong feature to be the imperative necessity of monumenting all claims with permanent and properly constructed monuments of stipulated dimensions, which cannot be destroyed by either cattle or passers by. The petition for any mining claim may be entered by those wishing to denounce the mining properties, and reasonable time is given in which to erect the monuments, and complete the correct survey after the application has been made to the government. The apex difficulties do not, of course, come up in Mexico, and it would seem that the system followed in that country is better in every way than that demanded by the United States Government.

Kirby Thomas (New York).—I believe that the Mexican system of locating by *pertenencias,* 100 meters square, with no extralateral rights, is satisfactory, and better than the American system of apex. The Mexican unit is small and can be adjusted on the ground to cover the outcrop and the possible extensions of the vein advantageously. The Ontario unit of 40 acres, conforming to the township and section survey, is very awkward in attempting to cover either the outcrop or dip, and also it requires the locator to take up a great deal of land worthless for his purpose.

The fundamental law of Mexico assumes the ownership of minerals, excepting coal and oil, by the government. I think this is a very satisfactory condition, but I do not see how it can be applied in the United States at the present time. The Mexican law fixes a percentage tax on the gross output, which is obviously and grievously unfair to the low-grade mines. Often the 3% tax on gold and 2½% on silver ores seriously cuts into the profit per unit on operations in which the margin between cost and return is small.

Peru.

J. F. W. Murdoch (Morococha, Peru).—I am strongly of the opinion that in *undeveloped* countries, such as Chile, Bolivia, and Peru, with which I am familiar:

(1) Mineral rights should be vested in the Government.

(2) Mineral rights should be acquired by denouncement, maintained by payment of an annual rent to the Government, whether worked or not, and terminated by non-payment of this rent.

(3) Mineral rights should be permanently leased so long as rent be paid. It is advisable to have different provisions for the leasing of those minerals such as coal, iron, petroleum, etc., which require the leasing of a large area for their proper working, and for the leasing of mines of the precious metals, copper, lead, zinc, etc., which are not so largely dependent on area. Placers and quarries require provisions differing from the above.

(4) Not being a lawyer nor a "mining expert," I believe that extralateral rights ought to be abolished.

George I. Adams (Cosmos Club, Washington, D. C.)—The only suggestion which I have to offer is that the Peruvian law be consulted, in which provision will be found for the payment of an annual contribution on all mining claims and the publishing of a complete register of all claims showing ownership, class of claim, location by districts, etc., and the state of perfection of title, that is, as to whether the contribution has been paid or not. This register has many points of value. The payment of the contribution does away with the assessment work feature. The only work on claims which is required is a sufficient amount to show the presence of the ore at the time of perfecting title. In case a claim lapses because of the nonpayment of the contribution, and of the fines which accumulate during a period within which it may be paid without loss of the claim, another may obtain title by payment of the same. In Peru, the contribution supports a School of Mines, the Corps of Engineers of Mines, and the clerical work of a Division of Mines which handles the legal papers and publishes the register.

Transvaal.

Geo. D. Stonestreet (Haileybury, Ontario, Canada).—My experience in the Transvaal, as Inspector of Mines for some years, enables me to give you some views which may be of value in your study of this important subject. In the Transvaal all precious stones and precious metals were especially stated to be the property of the state, and all semi-precious stones and metals were the property of the individual owning the land. The law there was held somewhat in abeyance for many years, and it was only just before the late war that the government started proceedings to recover some of the enormous arrears said to be due to it. We found that the law was clear enough, but owing to concerted action on the part of mine owners, we were able to come to some compromise, fair to both parties. Under the law, the owner of land upon which gold had been found was permitted by the law to retain a small portion, called the homestead, which was not taxed in any way, but the rest of the land pegged out as claims had to pay a yearly tax to the government (of which the owner got half) amounting to $1.25 per claim of 400x150 ft. (This was similar to the legislation of Mexico today.) But still the government considered that it had rights to the homestead gold, and this was settled by agreement, eventually by a payment by claim owners of a tax amounting to about 1½ per cent. of the gold actually produced from that homestead. As it was exceedingly difficult to prove what gold came from the homestead and what came from free claims, when both were worked at the same time, much confusion arose and the government generally got the worst of it. In other words, the methods were found unworkable in actual practice. It was always a moot point with us whether the government was not sufficiently paid in the one-half of claim licenses it was receiving, and that it had no claim to any other; but the war then came on and matters were never quite settled, and the position today is open to reconsideration at any time by the present government. So much for the Transvaal, whose history clearly shows what *not* to do.

South Australia.

H. Lipson Hancock (Wallaroo and Moonta Mining and Smelting Co., Wallaroo, South Australia).—The following resumé of the provisions in South Australia given in the "Encyclopedia of South Australia," a standard publication, may be of interest:

"Mining in South Australia is regulated by the Mining Act No. 587 of 1893, which provides for the acquisition of miners' rights, claim and leases .... All Crown lands, whether held or not, and all freehold land granted since 1888, are mineral lands over which miners' rights can be granted. A miner's right can be obtained for £5 and it entitles the holder to search for coal or oil, minerals and metals for a period of twelve months, and may be renewed at any time during its currency for another term of one year on payment of £5. It gives the holder the further right to peg out claims of specified shape and dimensions and the fee for registration is £2 6s. The size of the claim which may be secured depends on whether it is for alluvial gold seeking or reef working for minerals, coal or oil. The maximum area of a gold claim is 20 acres, a mineral claim 40 acres, and a coal or oil claim 640 acres. Gold claims may be registered immediately, and other claims within 30 days of pegging. The miner's right under which the claims are pegged must be produced to the registrar before registration can be effected, and it must be renewed from year to year or the claim will be liable to forfeiture. The holder has a right to a lease for 42 years, which, when granted, must be kept and worked. Gold leases of 20 acres are issued for that term at a rent of tenpence per acre and 2½% of the net profits. One man must be kept continuously employed for every five acres of the land leased. Holders of mineral claims or leases have a preferential right to a gold lease over part of the land so worked, and the holder of a gold lease is entitled to all metals, minerals, coal and oil on his leased land. Mineral leases of 40 acres are issued for 42 years at £1 per acre and 2½% royalty, or 6d. in the pound, and the conditions specify that one man for every 10 acres of leased land must be kept continuously employed. Any number of gold, mineral or coal leases may be held by the same person, and the Minister may permit the concentration of labor by the amalgamation of not more than four adjoining gold or mineral leases. Leases for coal and oil are issued up to 640 acres with 42 years' tenure, rental and terms to be fixed. One man for every 40 acres must be kept continuously employed on the land. Miscellaneous leases with 42 years' currency are granted on rental and terms to be fixed, for the manufacture of salt or gypsum, for working mineral springs, and for sites for smelting works, etc. The maximum areas are: salt or gypsum, 640 acres; mineral springs, 40 acres; mining works and smelting works, 10 acres. Under the Mining Act Amendment Act 1900, licenses, current for 12 months, to search for precious stones, mineral phosphates, oil, rare metals, minerals and earth, are issued on specified mineral lands. The fee is £20 per square mile, and one man for every square mile must be employed for at least six months of the term. The licensee has a preferential right to a lease of a portion of the land held under license as prescribed. In addition, the foregoing licenses, at £1 per annum, are issued, authorizing the holder to occupy a site for business and residence, outside of townships. Licenses to occupy for residence and cultivation in half-acre blocks are issued for 14 years, subject to renewal at £2 per annum.

"Respecting mining on private property, the Act of 1888 and amending Acts of 1895 and 1899 provide for the resumption of private lands, proclamation of private lands as an alluvial gold field and compulsory mining leases."

Western Australia

A. Montgomery (State Mining Engineer of Western Australia, Perth, W. A.)—For a good many years past, most of the governments of the Australasian states have adopted as a principle that when Crown lands are sold, granted, or leased, the demise does not include mineral rights of any sort as regards the precious metals and the more important metallic minerals. A person buying land for purposes of residence, cultivation, or any other ordinary occupation not depending on minerals in the land, is presumed to have obtained it for the ostensible purpose for which it was taken up, and not for unknown mineral values which it may ultimately prove to contain. The State and the purchaser then both know what part of the public estate is being treated for, and neither party has any call to be aggrieved if subsequent discoveries show that the land had mineral values in it which were not contemplated in the original transaction. The principle is not, however, carried out by any means completely, or to its logical conclusion of reserving to the state all values which may accrue to the land in the course of time from considerations not contemplated at the time of the original transaction, e. g., "unearned increments" due to position. All minerals are not strictly reserved, the land-owner being as a rule entitled to all benefit of such products as clays, slate, building stone, limestone, and similar minerals.

The older Australasian titles included all minerals in the fee simple of the land except the precious metals, and in a few cases even these were specially included also. These rights have rarely, if ever, been interfered with. In the case of lands over which the mineral rights have been reserved at time of sale, it is in practice so difficult to effect entry upon private lands to search for and work minerals, except with the consent of the owner secured by definite agreement with him, that it is rather uncommon for any attempt to be made to force them open for mineral selection, and the greatest practical difference between this case and that in which the land owner owns the minerals is, that the latter is not in any fear of compulsory resumption of his land by the government, at a valuation which takes no account of the mineral values, for the purpose of having it thrown open for mining operations, and consequently is free from the pressure which may be exercised upon the former class of owners to induce them more readily to admit mining on their lands on what they may consider unduly easy terms. The land owner remains in a pretty strong position, however, even if the minerals do not belong to him, as it is usually easier to make terms with him for entry upon his land than to get the machinery of government to work to have the ground resumed for mining purposes with consequential compensation of the land owner.

The general trend of Australasian legislation on this matter appears to be towards more rather than less restriction of the land-owner's rights, confining them to use of the surface for the purposes for which it was declared to be occupied, and towards greater facilities for mining adventurers to enter upon such lands in search of minerals and to work them without hindrance from the land owner. This seems quite a logical outcome of the root idea that the lands of the country belong to the state, that the surface is open to be sold to one owner for agriculture or any other declared purpose, while the mineral rights, with necessary wayleaves to work them, may be sold or leased to another person without more reference to the first than to compensate him fairly for the interference with his possession of the surface entailed by allowing mining on his land.

Much the same idea underlies the strong preference shown in this part of the world for leasehold tenure of mining lands as against freehold. The mineral rights are granted by the state on easy terms on the condition that they are worked, and that if not worked they revert to the state. a condition much more readily enforceable with leases than with freeholds. The mining investor's point of view is naturally a different one, and among such there is a strong desire for the fee simple, in order to be able to retain the mineral rights without working the mines, if their interests seem to them to make inaction the best course. Where a mine has been worked and come to the end of its resources for the time being, there is a good deal to be said for the freehold tenure, as it gives better opportunities to the owners to wait the chances of sale of their property, or of recuperating their finances. From the state point of view, however—which is very similar to that taken by a private owner of mineral lands when he lets portions of his ground for mining purposes—the most essential consideration is to have the ground worked, and if not worked by the first holder to be thrown open as soon as possible for anyone else desirous of coming in to work it. The terms given by the Australasian states to their mining lessees compare very favorably indeed with those commonly granted in the United Kingdom by landowners to the mining companies and others who take mines on lease, as regards continuity and scale of working. The administration of the law is also usually much less harsh than is permitted by the letter of the Statutes, the governments taking powers to act in these which they need not necessarily enforce to the utmost unless the circumstances seem to require their full exercise. In this also they follow the example of most private landowners, who require discretion to be left with them as to how much more or less strictly they may enforce the conditions of their mining leases, and the less personal and more public-spirited views taken by members of a government as compared with private landholders may be relied upon to effect greater consideration for the mineral lessees.

Preference for a freehold or leasehold tenure of mining lands depends very greatly on the nature of the interests of the parties concerned, and in considering the principle most expedient for a state to adopt, regard must be had to the predominance of interests. If the matter of greatest moment is to attract the capital of investors to the development of the state's mineral resources, it may be politic to meet their views upon security of tenure and allow them to acquire the freeholds which they so much desire, with complete control of their future development entirely at their own will. This is the bargain which appears to appeal most strongly to capitalists, and to secure their support a state may think it best to offer them a proposition to their liking. If, however, the state prefers to keep the control of its mineral lands in its own hands, to prevent their being locked up for years for speculative purposes, and to offer facilities for the location and working of mines by parties of its citizens who may have little or no capital but their labor, the leasehold system seems entirely preferable. It is to be remembered that in framing legislation the state has decision of its policy altogether in its own control and has a right to settle it in what it considers to be its own best interests, and at one stage of its development it may well find it most expedient to offer its mines on freehold terms, and at another to change more or less entirely to a leasehold system. Where the immediate support of capital is not of prime importance the leasehold system appears to me to be usually more in the best interests of the state than the freehold one, and in making its laws it is surely for the state to consider its own interests first, to the subordination of all others. The mining laws express the terms on which the state offers its mineral lands for exploitation, and should be drawn up to conserve the interests of the state first and foremost, studying those of outsiders only from the point of view of benefits to accrue to the state. The mining investor who clamors for all sorts of concessions from the state in return for putting his money into its mines rarely appears to consider that the state has any rights, and looks at the proposition entirely from his own point of view, and is apt to agitate for legislation on lines designed entirely to further investor's interests without any regard to those of the state. This is natural enough, but what would one think of statesmen who in advocating outside interests should forget their duty to their own state?

In discussing the lines on which mining legislation should proceed, therefore, the members of the Mining and Metallurgical Society should remember to hold the balance clearly between the somewhat opposing interests of the buyer (the mining investor) and the seller (the state) of the mineral lands, and take a wide view of the question, looking at what is best for the development of the mineral industry as a whole with due consideration of the points of view of both parties. There must be more or less of a compromise, to encourage the investor to the utmost to open up mines by giving him good security of tenure and all reasonable latitude in development and working, while at the same time conserving the State's interests by preventing mineral lands from being locked up and monopolized without being worked. It may be prejudice, owing to my being accustomed to the leasehold system, but it appears to me that leasehold tenure offers a better basis of negotiation in this respect than can be obtained from any freehold system. Australian experience of mining freeholds has been anything but encouraging.

The above remarks cover a good deal of your questions Nos. 1, 2, and 3. As regards initiation of mining rights the Australian practice is based on priority of right to be allotted mineral lands, and the "miner's right" system gives him a large measure of security in at once taking possession of the ground. Priority of pegging out ground and applying for lease thereof is also fully recognized in issuing leasehold titles, and a discoverer usually protects himself by applying for a lease as soon as possible after making a valuable discovery. The system of prospecting licenses in vogue in Western Australia allows time to a prospector to test a piece of ground before taking it up on lease, and has proved very useful. It is not customary here to insist that minerals shall have been actually found on ground applied for before a lease is issued, and it very commonly happens that "position blocks" are taken up all round a new discovery in the hope that subsequent prospecting may find something on them. The obligation to work these blocks under pain of forfeiture leads to their being pretty closely searched for minerals, and if an owner is lax in this respect he knows that others may apply for the ground over his head, on the ground of his insufficient working, and get it away from him. Question has often been raised if it would not be better to require some actual discovery to be made before a lease is issued, but the present system works very well, and enables people to secure a piece of land for their own uninterrupted prospecting, which is more generally satisfactory than if no one had a title to the land until an actual discovery were made.

The question of terms of renewal of mining leases is one on which there is much difference of opinion in Australasia, but as a matter of practice in few instances have the terms for renewal of leases for a second or third term been made very seriously different from those of the first term. The good sense of governments comes in here, and their impersonal interest in the matter, to ensure that renewals are dealt with on broad and general principles and not on any rack-renting policy which might commend itself to a private owner of land in a like position. Most of the states' governments reserve the right to impose increased rental and sometimes royalty in the event of granting a renewed term of lease, but I am not aware of any instance of its being exercised to any extortionate extent.

Most of the Australasian states grant much larger leases of land for coal and other minerals which are of low value per ton, and are worked out rapidly over large areas, than for metallic minerals, and generally mineral leases for tin, lead, bismuth, and other base metals are of larger areas than are allowed for gold. It is difficult to see any very sound reason for differentiating in the areas allowed on, say, gold and tin lodes, as the nature of the workings is quite similar and also the rate of exploitation. Ton for ton, both sorts of ore are of much the same net value, and it is immaterial to the owner who gets a profit of a dollar a ton whether it comes from gold or tin values. The difference in areas leased appears to be merely a concession to popular ideas that gold mines are naturally more profitable than those of base metals, which of course is entirely a misconception. The principle which should govern the extent of ground to be granted seems rather to be rate of exploitation than value of mineral, the area to be granted being such as—taking into account the mode of occurrence of the ore—will allow the leaseholder ample time to work his mine long enough to make it well worth his while to undertake the proposition and to ensure redemption of his capital expenditure before the mine is worked out.

The lateral rights principle obtaining in portions of the United States is a standing marvel to the rest of the world, and that it could be seriously proposed to perpetuate it outside of cases in which it has unfortunately been already granted seems incredible to most outside engineers with whom I have come in contact. If all ore deposits could be relied upon to behave themselves in accordance with elementary diagrams in the text-books, representing a few of the simpler occurrences of fissure lodes, there might be some hope of maintaining the extralateral rights system on consistent and logical grounds, but since their forms are in fact protean and never predictable with any real certainty, and since even the best authorities differ, often radically, in their views as to the nature and origin of the ore occurrences, there seems no hope of attaining such precise legal definitions as will serve to decide justly all cases of extralateral right. The claim of the discoverer to follow out his discovery in all its ramifications has a certain amount of apparent justice, but is practically impossible to be granted in very many cases without infringing the equal rights of other parties. If the first man to obtain petroleum by boring, for example, were to have the right to all petroleum that would come to his wells, thus exercising the right of the discoverer to its utmost, he should be protected from the boring operations of neighbors, whose bores may and probably will tap oil that othewise would flow to the discoverer's well. What a lovely problem for courts to decide on the evidence of "expert" witnesses whether bore *A* would have got the oil obtained from a neighbor's bore *B* if the latter had not been made! Again, in coal seams or any bedded deposits, should a discoverer have an extralateral right to follow his discovery beyond the limits of his location? If so, he could monopolize the whole seam, but if he is not given this right why should it be given in the case of a lode? Some limit has to be placed on the rights of the discoverer, and it is surely best to follow the same principles as obtain in all other occupancy of land and confine his operations within the boundaries of the land he has located.

PERSONAL

J. Parke Channing left Miami, Ariz., June 19 for California. From California he expected to leave on a tour of inspection and examination of mining properties in Nevada, Washington, Montana, Michigan and points in the Lake Superior region.

S. H. Chauvenet has resigned as manager of the Berkshire Iron Works. The furnace has been shut down for an indefinite period.

Francis Drake is now general manager for the Lonely Reef G. M. Co., Ltd., in Rhodesia.

A. D. Foote has been succeeded as general manager of the North Star Mines Co. by his son, A. B. Foote. Mr. Foote, Sr., will act as consulting engineer.

B. Britton Gottsberger, who has been recovering from an operation for appendicitis, was expected to return to Miami to resume his duties July 15.

U. S. Grant is at the head of one of the geological parties of the newly created Oregon Bureau of Mines this summer.

L. C. Graton read a paper on "A Microscopic Study of Sulphide Ores of Copper" before the Geological Society of Washington on April 23.

H. W. Hardinge sailed for Europe on the S. S. Olympic June 14 on business connected with the Hardinge Conical Mill Co. and intends visiting England, Italy and Russia.

R. V. Norris delivered a series of six lectures on mining at the Columbia School of Mines during April.

Walter Harvey Weed has taken over Stevens' Copper Handbook, and will be its new editor and publisher.

Edward S. Wiard is engaged in testing ores for the Vindicator Consolidated Mining Co., Cripple Creek, and designing a plant for their concentration.

CHANGES IN ADDRESS

Guernsey, F. W. ...c/o Mason Valley Smelter, Thompson, Nev.
Kirby, E. B..................918 Security Bldg., St. Louis, Mo.
Lindsley, Halstead.......................Idaho Springs, Colo.
Morley, Frederick H..1321 Wood Ave., Colorado Springs, Colo.
Munro, Charles H..1057 Monadnock Bldg., San Francisco, Cal.

Mining and Metallurgical Society *of* America

Vol. VI. August 30, 1913. No. 8.

ANNOUNCEMENTS.

Bound Volumes.—Bound volumes of the bulletin of the Society for 1912 may be obtained from the Secretary for the price of $1.50. Any member desiring a complete set of the bulletins for 1912 unbound can obtain it, free of charge, by application to the Secretary. Volume IV (1911) may be obtained at the same price, but no complete sets of bulletins published prior to 1911 are now available.

San Francisco Section.—Meetings of the San Francisco section are scheduled for the first Monday of September and of December, 1913. Other meetings may be held on call of the chairman.

New York Section.—A meeting of the New York Section will be held at 8 p. m., on Thursday, September 18, at the Chemists' Club, preceded by a dinner (informal) at 6:30 p. m. At this meeting the officers for the year 1913-14 will be elected.

W. R. Ingalls,
Secretary

COMMUNICATIONS

Revision of the Mining Law.

The following communications have recently been received by the Secretary:

George W. Riter. (Salt Lake City, Utah.)—The several recommendations contained in the report of the Committee on Mining Law have my hearty support. My own inclination, however, would be to add to the text, so as to touch somewhat more strongly on what I consider the worst feature of the present law, namely the uncertainty as to right of possession prior to patent, and with that idea in mind I suggest the following:

> (11) The law should provide a limiting period within which mining claims must be officially surveyed, unless located according to legal subdivisions.
>
> (12) Final proof should be required of a claimant within a reasonable number of years after date of location.
>
> (13) The public land surveys should be extended immediately over all mineral lands of the public domain.

While trying to get rid of the extralateral right in future mining titles, why not also try to get rid of the secondary provisions of the law, growing out of the theory of the apex, which have become even worse in practice than the extralateral right itself? I refer to the loopholes that permit lode locations to remain in loose, indefinite state, for an unlimited period of time, without even a survey or a record of any kind in the United States Land Office.

It was for the sake of the extralateral right that lode locations were required to have peculiar shape. If a claimant chose to have his location surveyed, it had to be surveyed according to peculiar rules; and if he chose to apply for patent, a peculiar and cumbersome routine was prescribed. In one way and another, the law was so loaded down with cumbersome details that the lawmakers seem to have recognized the routine as being both expensive and burdensome; and out of regard for the poor prospector who could ill afford the outlay for that sort of thing, the law did not require him to go through it unless he chose to do so.

With the lapse of time, it has become more and more difficult, if not absolutely impossible, to determine what mineral lands are held under a valid right, or whether any valid rights exist at all within certain areas. Perpetuation of boundary monuments of unpatented lode claims is not even required. The official notes filed in the land office of claims that happen to have been surveyed for patent, show that in a surprisingly large number of cases the location corners could not be found by the surveyors at all or were not in the places contemplated by the location notices.

The final result in every active mining district is groups of tangled claims, whose rights and boundaries, when any valuable ore deposit is involved, must usually be determined by litigation as expensive and as distressing as the stakes are high. Elliott Lord says that during the first seven years on the Comstock Lode, twelve leading companies were involved in 245 law suits, nearly all of which were over the right of possession. (Comstock Mining and Miners; Monograph IV, U. S. Geol. Survey, 1883, p. 177.) On a smaller scale, every other mining region goes through a similar experience whenever rich ore is found. The precious-metal mining industry in our own generation will remain under a cloud until the mining rights already acquired under old laws are made matters of definite record.

As to future locations, why not bring lode deposits under the provisions of the placer law, requiring locations to conform to legal subdivisions of the public lands? As the law now stands, legal subdivisions of the public lands may be further subdivided into ten-acre tracts, and a placer claim may be a group or a string of such ten-acre units. No further survey or plat is required in a proceeding to obtain patent. Under this system, the initiation and perpetuation of mining rights could be made matters of definite record at the very outset; and cautious investors, who now keep away from mining ventures during the period of infancy, rather than waste the time and money necessary to find out whether the title is any good, could then have something definite to go on. By imposing annual burdens or taxes, for the perpetuation of a mining right, in proportion to the area embraced, it might not even be necessary to place a limitation on the size of a claim.

Peaceable and profitable mining operations are founded, nowadays, not on apex rights, but on acreage and assured right of possession. It is for the purpose of satisfying cautious investors that we resort to the subterfuge of make-believe discoveries, and waste money on make-believe development work, in order to acquire title to acreage.

Frederick F. Sharpless.—Feeling that the question of classification and segregation has not received its due share of discussion in the communications previously published, I venture to send you my opinions relating more particularly to that subject.

Were it possible to classify lands into groups that could be operated more profitably for one purpose than for another, and to have that classification remain sound for generations to come, such classification would be most desirable whatever mining regulations might subsequently be adopted; but satisfactory classification has been and will always be most difficult, if not impossible.

After years of operating, it is to-day impossible for geologists to segregate Missouri acreage that is more valuable for agricultural, from that more valuable for mining purposes. Was the oil-bearing district of Los Angeles more valuable for its oil or for town-site purposes? Are some of the sandstones and quartzite areas of Colorado more valuable for their mineral or for their agricultural possibilities? Is the Louisiana sulphur district more valuable for its mineral or for its farm products? Fifty years ago would Northern Minnesota have been classed as more valuable for mineral or for forest products? And fifty years hence may not some of the forests of Washington and Oregon be the location of profitable mines? Who can tell?

The list of questions might be continued indefinitely. Satisfactory answers might be given for what has been developed in the past, but the application of new discoveries may make a useless or little known mineral of to-day one of great commercial value in the near future, or an unsuspected locality may unexpectedly become an important producing area, and the absence of surface indications may in a few years render futile present attempts at premanent classification. In spite of our accumulation of geological knowledge, there have been so many mistakes in the past, and there will be so many in the future, that a separation into two classes, mineral and non-mineral ground, seems inadvisable.

That certain areas may be judiciously denominated as oil, gas, coal, brine, sulphur or phosphate bearing, and when thus classified be handled on a different basis from those containing the metals and precious stones, is not only possible but practicable and desirable. To make any hard and fast rules limiting the use of these areas to location and exploration for the specified product, or limiting the exploration for these substances to such areas, would be most unfortunate.

The greatest good for the greatest number will be accomplished by permitting the prospector to search for what he wants wherever his inclination leads him, so long as he does not trespass on previous vested rights. In the past the prospector has come very near to having this right; it is certain that our laws were shaped with that intention. If they have been defective, let us see if we cannot remove the defects, and even go further and give him opportunities that he has not previously had. The conservation idea is taking a firm hold on the public mind and many a miner thinks that he is getting the short end of the proposition.

Would it not be better for him to fall in with prevailing ideas and ask that, as conservation is in order, the mineral rights of public lands be conserved for him and not deeded to agriculturists, railways and those who pretend to use only the surface of the earth?

If in the future the Government retained title to the undeveloped resources below the surface to which it gave title, wherein could the farmer or the miner be harmed? The farmer would get all that he paid for and be absolutely protected in it, while the miner would not suffer by having the limits within which he might prospect reduced by that much acreage. There are certainly many prospectors who know of good-looking croppings on land that the railways have taken up as agricultural, and while these prospectors may not like the sound of "restricted prospecting," they would be only too glad if the Government still had the right to the minerals and would lease or sell them a place to mine.

But "what is sauce for the goose, is sauce for the gander," and if the prospector asks that the mineral rights be reserved for him, he must not ask for all the surface when he is locating his mine. He can well afford to say to the Government, "Keep as much of the surface as I do not require for my purposes, and give it to the farmer, the manufacturer, or the railway, if you will keep the underground portion of the land for me." The miner may need all of the surface above his mine, or even more, as in the low-grade copper and iron mines, and there is no reason why he should not be permitted to buy what he needs. Those of us who have had to buy mining claims at mine prices, in order to get room for waste dumps and tailing ponds, can appreciate the advantage of having a distinction between underground and surface rights. The right to quarry or to the use of a clay bank demands that he who operates must use the surface as well as that which is under the surface. Segregation would in no way interfere with his right to buy or use either.

Segregation of mineral rights would hurt the farmer, the timber owner, and perhaps the town-lot owner in that it might take away from him his rights in something that he had not paid for, was not expecting, or was procuring by fraud. But so long as he is entirely protected in what he did buy, his rights are not comparable with those that should be reserved for the miner or one who is willing to risk a stake to see what is under the surface. The idea of segregation of mineral from surface rights is not so revolutionary as to be considered impracticable, and if I am right in my argument as to the impracticability of a satisfactory classification that will hold for years to come, segregation will eliminate the necessity and expense of that classification, as well as tend toward the more rapid development of our mineral rsources.

The one argument presented against segregation, which appears as of some importance, relates to the confusion and inconvenience that may result from the ownership of the same piece of ground by two parties. If the Government is to deed outright both surface and mineral rights, after segregating them, this will be an admitted inconvenience, but certainly not one that should outweigh all the arguments in the opposite direction.

As to alienating or leasing mineral rights, this bears on classification at several points. That the Federal Government should lease its mineral rights for the monetary benefit of itself and its wards, the people, will not be maintained by those of us in sympathy with our present form of Government. A direct monetary benefit would not necessarily be any great public benefit. The greatest benefit that can come to the whole of us in this connection is that as many mines as possible should be operated in as many places as possible. If the Federal Government can assist in this direction by retaining title and leasing rather than selling, it should lease, and it would then fulfil its duty which it undertook to perform when it accepted the trust of administering the public lands to the best advantage of all the people.

The idea of prospecting or operating under a lease is objectionable to many mining men and capitalists, not that they can point to many real or tangible objections, but because it sounds somewhat socialistic, because it has not been the custom of the country and because leases from private individuals have sometimes caused trouble when badly drawn or not lived up to. The leasing of mineral rights by the Government, as practiced in Mexico, has been eminently successful, so much so that nearly every one who has operated in that country, and in this, looks with favor on the system.

It must be admitted that when land can be properly classified, and the government and purchaser know exactly what is being sold and bought, capital can be more readily secured for purchase than for lease, and it is admitted that such sale, in a way, is fair to both sides. Then if one is willing to tie up considerable sums of money in claims which he does not operate, he may say with some justice that it is his loss and no one's else business. On the other hand, our Government undertook to dispose of the public lands for the benefit of all people. Idle claims on which no outsider can work are certainly of no benefit to the public. A valuable claim under government ownership would be of no public benefit either, but no one can say at what time a presupposed valueless area may become worth operating, and if open to prospectors the date on which it may become valuable will be earlier than if closed to prospectors. A lease carrying with it a small acreage tax would produce something for the people, and such a tax can scarcely be regarded as unjust. If the holder of the lease, for the time being, thinks the property not worth this tax, it becomes open ground for any one so disposed to develop. It may be money thrown away, it often would be, but if anything is found the public will benefit.

In the event of its being impossible to classify certain lands correctly (and there are undoubtedly thousands of such acres) and if it is known that such lands have a present value for certain purposes, the difficulty of disposing of them for such purposes as they can be used for at present may be entirely overcome by segregating the surface from the mineral rights and reserving the latter to be leased at such time as some one may call for them. Surprises in the way of mineral wealth have been frequent; they will continue to come for all time. And while the discoverer is certainly entitled to a handsome reward, the Government should not be in the position of already having disposed of all right, title and interest in the discovery. The only feasible way to prevent such losses to the Government and people at large is for the Government to retain title, and lease the right to prospect or mine when it becomes advisable to do so.

Again, some plan of leasing would tend to mitigate the one tangible objection to segregation, the conflict of surface and underground rights. The Government which had never disposed of the title to its mineral rights would be in a better position to make an equitable adjustment in such conflicts than would any private individual.

In regard to the other propositions, various contributors have advanced the arguments for the reasons of my belief and it is unnecessary to repeat them.

Summary:

1. I am not in favor of classification of lands. I do favor segregation of mineral from surface rights.
2. Mining rights should be initiated in much the same manner as heretofore; they should be perpetuated by an annual tax on each unit of land held, and terminated when the tax is no longer paid.
3. Mineral rights should be leased. The unit of land located should be a square, an area of 1-16 or 1-64 of a square mile, its sides bearing true north, south, east and west. So far as possible, all mineral locations to be made, held, operated, and terminated under the same

regulations. Special provisions should be made in regard to the location, operation, and leasing of a multiple of units in the case of those substances requiring special provisions, as coal, petroleum or brines.

4. Vertical boundaries should be adopted and the extralateral rights principle abandoned.

PERSONAL

John W. Finch has received the honorary degree of doctor of science from Colgate University.

J. D. Irving is occupied in the prosecution of work for the United States Geological Survey on the Leadville District, Colorado.

James F. Kemp has been appointed chairman of the committee on mining geology of the American Institute of Mining Engineers, succeeding Waldemar Lindgren, resigned. Prof. Kemp was given the degree of doctor of laws by McGill University at a special convocation on Aug. 2 on the occasion of the visit of the International Geological Congress to Canada.

F. H. Morley was married on May 5 at Bournemouth, England, to Mrs. Davis. Mr. and Mrs. Morley will reside at Colorado Springs, Colo.

H. C. Wilmot has resigned as superintendent of the Colorado Mining Co., Aroroy, Masbate, Philippines, and has accepted the managership of the Syndicate Mining Co.

George J. Young has been appointed professor of mining at the Minnesota School of Mines.

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Vol. VI. September 30, 1913. No. 9.

ANNOUNCEMENTS

Back Numbers of Bulletin.—The following copies of the bulletin are out of print and are needed to complete sets for which requests have been received by the Secretary: Nos. 1, 3, 7, 19 and 26. If any member has copies of any of these bulletins on hand which he does not care to retain for his own use, he is urgently requested to send them to the Secretary.

New York Section.—A meeting of the New York Section will be held at 8 p. m. on Thursday, October 23, 1913, at the Engineers' Club, preceded by a dinner (informal) at 6:30 p. m.

San Francisco Section.—A meeting of the San Francisco Section was held at the Hotel Oakland, Oakland, Calif., on September 15. The minutes of this meeting have not yet been received by the Secretary.

Nominations for 1914.—By-law No. 11 (revised May 1, 1913; see bulletin No. 58, p. 71) provides that "Three months before the annual meeting the Secretary shall send a nomination ballot to each member of the Society in the districts for which new councillors must be elected, * * * * and shall send a nomination ballot to each member of the Society entitled to vote, with the request that he shall nominate one member for president, one for vice-president, and one for secretary." New councillors for the year 1914 are to be elected in districts 1-2-3, 6, 7 and 9-10 to succeed T. H. Leggett, Waldemar Lindgren, H. V. Winchell and H. Foster Bain, respectively, whose terms will expire.

Ballots in accordance with the above will be issued by the Secretary on or about October 13, 1913.

Award of Annual Medal.—The following letter has been sent to all members of the Society:

New York, Sept. 22, 1913.

At a meeting of the council of the Society on Sept. 16, it was decided that the subject of the award of the annual medal of the Society in January, 1914, should be "For contributions to the literature of mining."

According to the rules, members are now limited in their expression of opinion to that subject. However, it is still open to members to make nominations within that limitation. Members who have not already expressed their opinion are urged to do so in a communication to the Secretary.

W. R. INGALLS,
Secretary.

MEETING OF COUNCIL

A meeting of the council of the Society was held at the Engineers' Club, New York, on September 16, at 5 p.m. The members present in person were Messrs. Chance, Ingalls and Kemp. The members represented by proxy were Messrs. Finlay, Garrison and Leggett. The total number of members present in person and by proxy was six, this constituting a quorum. Dr. Chance presided.

The Treasurer reported that, acting under the authorization of the council, he had purchased for the Society two St. Paul 4½% General Mortgage Bonds at the price of 99½, and had deposited these bonds with the trust department of the Guaranty Trust Company of New York in the name of the Society.

The Secretary reported that in conformity with the rules for award of annual medal, a circular letter was issued to all members of the Society on July 1, this being six months previous to the second Tuesday of January, 1914, when the first award will be made. At this meeting, four months before the date of award, the council must determine the specific object for which the medal is to be awarded. The report of the medal committee was published in bulletin No. 59, p. 85.

The Secretary reported a letter dated June 30, 1913, from James A. Barr, Manager of the Bureau of Conventions and Societies, Panama-Pacific International Exposition, in which he says, "We are hopeful that the Mining and Metallurgical Society of America will decide at the proper time to hold their convention in San Francisco in 1915."

The Secretary reported the receipt of the following communication from the American Institute of Mining Engineers under date of August 27, 1913:

> The following minute was adopted by the Board of Directors at a meeting thereof, held at Butte, Montana, Wednesday, Aug. 20, 1913:

"The Board of Directors of the American Institute of Mining Engineers has carefully considered for several months the question of union or affiliation with the Mining and Metallurgical Society of America; and while at the earlier time and under other circumstances such union might have been accomplished, yet under present circumstances, the Directors of the Institute deem such union inexpedient.

"While thanking the Mining and Metallurgical Society of America for its consideration of the matter, we believe that further discussion of the subject will serve no useful end, and we conclude it best that the Society and the Institute continue their useful functions and friendly relations side by side, as heretofore."

The Secretary recommended the appointment of a standing committee of three members on mine taxation to be appointed by the President of the Society.

At the meeting of the New York Section on April 17, 1913, the council was requested to authorize the appointment of a committee on apprentice work. It was recommended that this committee consist of mine operators and professors, who should be requested to study the subject and perhaps organize some system by which the Society could be made of use to young graduates.

Upon motion, duly seconded and unanimously carried, the form of medal shown by the medal committee in bulletin No. 59 on the plate facing page 86, was adopted. It was voted that the subject of the award of the medal for 1914 should be "For contributions to the literature of mining."

Upon motion, duly seconded and unanimously carried, the preliminary report of the Standardization Committee, signed by Robert Peele was ordered to be printed in the bulletin of the Society.

Upon motion, duly seconded and unanimously carried, it was decided to hold a general meeting of the Society in San Francisco in 1915. The Secretary was instructed to notify James A. Barr, Manager of the Bureau of Conventions and Societies, Panama-Pacific Exposition, to that effect.

Upon motion, duly seconded and unanimously carried, the Secretary was instructed to acknowledge receipt of the letter from the American Institute of Mining Engineers under date of August 27, 1913, and to place said letter on file among the records of the Society.

Upon motion, duly seconded and unanimously carried, a standing committee of the Society on mine taxation was instituted, this committee to consist of three members, and to be appointed by the President of the Society.

The Secretary reported that in conformity with the by-laws of the Society he had tentatively made the following classification of the membership into council districts for the election of councillors at the annual meeting in January, 1914:

Membership eligible to vote, 224. Divided by 12 the quotient is approximately 18.7. Upon this basis the following division is made:

Districts		
1-2-3.	New York (48), New England (11)	59
4-5.	New Jersey (3), Pennsylvania (25), West Virginia (3), Ohio (3)	34
6.	District of Columbia (10), Southern States (3), Maryland (1)	14
7.	Michigan (7), Minnesota (4), Wisconsin (2), Illinois (1), Iowa (1), Missouri (6)	21
8.	Colorado (14), Utah (7)	21
9-10.	Oregon (1), Alaska (2), Northern California (34), Philippine Islands (1)	38
11.	Arizona (4), Mexico (5), Texas (2), Oklahoma (1), Southern California (7)	19
12.	Montana (4), Idaho (3), Washington (2), Canada (6), Nevada (3)	18

Upon motion, duly seconded, the division proposed by the Secretary was unanimously adopted. Approval of this division had previously been expressed in writing by Messrs. Penrose, Munroe and Goodale, members of the council.

It was moved, seconded and unanimously carried, that the report of the Committee on Mining Law, as printed in bulletin No. 59, pp. 85-94, be submitted to letter-ballot of the council.

W. R. INGALLS,
Secretary.

MEETINGS OF SECTIONS

NEW YORK

A meeting of the New York section was held, after an informal dinner, at the Chemists' Club, on Tuesday, Sept. 16, at 8:30 p. m. The meeting was called to order by the chairman, Mr. Stone. Those present were: R. M. Catlin, L. D. Huntoon, W. R. Ingalls, J. F. Kemp, H. H. Knox, J. V. Lewis, A. H. Rogers, T. T. Read, E. G. Spilsbury, G. C. Stone, F. W. Smith, and W. Y. Westervelt.

The Chairman—The minutes of the last meeting have been published in the bulletin and unless there is some correction we shall accept them as published. The first business we have tonight is the election of officers for the ensuing year. The officers are chairman, vice-chairman and secretary.

Mr. L. D. Huntoon nominated E. G. Spilsbury for chairman, and Henry S. Munroe for vice-chairman. Mr. Ingalls nominated Mr. Huntoon as secretary for the ensuing year. There being no other nominations the chairman was instructed to cast a vote in favor of the candidates nominated.

Discussion on Award of Medal.

The Chairman—Mr. Ingalls, do you care to make any announcements from the council or otherwise?

W. R. Ingalls—From conversation that I have had it appears that the award of the annual medal by the Society is not clearly understood. The medal committee made a report last April, and in bulletin No. 59, dated April 30, were published two pictures showing the designs for the medal which were made by Tiffany & Co. The designs are the same except in size. On the first page is shown the medal that will cost $100 and on the next page the same design is shown of a little larger size, which will cost $150. The council this afternoon adopted the smaller size for the reason that this is all the appropriation will permit. The appropriation was made by a referendum to the membership of the Society and it would not be an easy matter to secure any change in that particular owing to the nature of our procedure. It probably would take six months to make such a change. Consequently, the council approved the smaller size.

Several months ago the secretary issued a circular letter to all members, inviting expression of opinion as to the subject and as to the person to whom the award should be made. At a meeting of the council this afternoon it was decided to make the subject of award "Distinguished contributions to the literature of mining." We have not received, so far, many nominations for the award of the medal, and I think perhaps many of our members have not understood what was wanted. This is the first time we have done this and the nature of the procedure is not well established; hence we have to feel our way more or less, but it would be very desirable and certainly helpful to the Committee on the Award of Medal if everybody would send in a communication expressing an opinion as to whom the award should be made. The present status is that the award is to be for distinguished contributions to the literature of mining; there cannot be any change as to subject, but within the limitations of that subject every member ought to send in his nomination. The matter is still in the stage of the direct primary.

H. H. Knox—How much is included by the word "mining"?

W. R. Ingalls—The council puts the broadest construction on the word.

E. G. Spilsbury—Is it the intention of the council to send out another circular defining exactly the subject for which the medal is to be awarded this year?

W. R. Ingalls—The matter is up to the committee on medal at the present stage. The council did not direct that any additional letter be sent out, but I think that might well be done.

J. F. Kemp—I got the impression at the council meeting this afternoon that it now rests with the council to make the award.

W. R. Ingalls—The committee still has the matter under consideration and does not have to report to the council for two months, and during that time the rules permit the voting by members, within the limitation of the subject.

Revision of Mining Law.

The Chairman—We have had the report of the committee on the revision of the U. S. mining law before the Society for some time. It was first published in the April bulletin, and there has been considerable correspondence regarding it in later bulletins, all of which you have at least had an opportunity to read; I think it would be well for us to discuss that report this evening. I will ask Mr. Ingalls to tell us the present status of that report.

W. R. Ingalls—The amount of labor that the committee has put into this matter makes it deserve careful attention and consideration. The committee was appointed several years ago with Mr. H. V. Winchell as chairman. Mr. Winchell was very much interested in the subject and devoted more time and attention to it than the chairman of such a committee ordinarily does. The report of this committee was submitted under date of March 15 of this year and was printed in bulletin 59, page 93. No formal action was taken on the report of the committee until the meeting this afternoon, at which a motion was made that it be referred to the council for letter-ballot, the result of which cannot be known inside of a month. If the letter ballot of the council should be favorable, the next step in our regular procedure would be a motion to refer the recommendations of the committee to the membership of the Society for their vote. In the meantime, the report of the committee is open to any kind of discussion that the members see fit to give it. These recommendations will be found on pages 93 and 94 of bulletin No. 59, and the recommendations, ten in number, are the points to which attention ought specially to be directed.

I might add to what I have already said that Mr. Winchell has had some conference with members of Congress, and especially with some influential members of the Senate, and there is some prospect that a revision of the mining law may be brought to the attention of the president in such a way that he will be interested, at some time during his administration, when his hands are not quite as full as they are just now. It appears therefore that there is some prospect that action in the matter of revising the law, for which many of us have been crying for many years, may be actually achieved; anyway, some important steps may be taken during the not very distant future.

[First recommendation read.]

1. The mining law should be revised, not piecemeal, but thoroughly, so as to co-ordinate and harmonize its various provisions.

On motion of Mr. Westervelt the first recommendation was approved.

2. Mining claims should be locatable regardless of a "discovery" and held only so long as the specified development work is performed.

R. M. Catlin—It does not appear clear to me just what constitutes a mining claim. Would any one be able to locate?

J. F. Kemp—In reply to Mr. Catlin one might say that a locator should be permitted to stake his claim wherever he would be willing to do $100 worth of development work each year. In writing to Mr. Winchell about this matter, I suggested that a man should pay a certain sum for his claim, rather than that he should be required to do some development work. It seems much simpler if a man who held title to the claim were required to pay a certain sum of dollars, and if he did not do it the claim would be open to re-location.

A. H. Rogers—Where is the matter of obtaining title referred to?

E. G. Spilsbury—I move that provision should be made under recommendation No. 2 for the patenting and acquiring of absolute title to the property under conditions that might be specified under the law.

[Motion seconded and passed.]

3. Placer locations should be limited to deposits of loose material above solid bed rock. The locator should have a preference right to locate also any lodes developed on his placer ground.

A. H. Rogers—I move to substitute for recommendations Nos. 3 and 5 the following recommendation:

A uniform type of mineral location should be provided to cover all classes of mineral deposit, whether lode, placer, or other type, location of and title to which shall be subject to the same regulations.

[Motion seconded and carried.]

4. A statute of limitations should establish a reasonable term of years beyond which placer patents shall be immune from attack on the ground of fraud.

R. M. Catlin—I move that the word "placer" in recommendation No. 4 be eliminated.

[Motion seconded and carried.]

5. Provision should be made for the location and working of petroleum, phosphates, rare earths, haloids and other mineral substances not specifically mentioned in the present law.

[Replaced by Mr. Rogers' recommendation above.]

6. Full privilege of appeal to some competent court of law should be provided for in all cases of contests between rival claimants, or between a locator and the government.

[Recommendation No. 6 was approved.]

7. Notices of mining locations should be so recorded as to give the fullest possible notice to the world and to all concerned.

J. F. Kemp—I move to strike out the words "to the world and."

[Motion seconded and carried.]

8. The apex law should be abolished.

[Recommendation No. 8 was approved.]

9. Existing titles should be reaffirmed and fully recognized and no effort should be made to create retroactive legislation.

E. G. Spilsbury—I think in this paragraph something along the following lines should be incorporated:

That any communities in which the existing titles had already been granted should have the right to give up the extralateral rights if a majority of the mines in that district so decide.

[No action taken on Mr. Spilsbury's suggestion. Recommendation No. 9 was approved.]

10. For the purpose of giving the fullest consideration to the needs of every branch of the mining industry and every section of the country, it is desirable that a government commission be created by act of Congress, whose duty it shall be to investigate by every proper means the questions and interests here referred to, and to make recommendations as a basis for the proposed mining law revision.

[Recommendation No. 10 was approved.]

The meeting adjourned at 10:10 p. m.

L. D. HUNTOON,
Secretary of Section.

COMMITTEE ON STANDARDIZATION

The committee on standardization, consisting of Messrs. C. R. Corning, Hennen Jennings, and Robert Peele, held its first meeting on February 9, 1912, and organized with Mr. Corning as chairman. At the outset, it was arranged that Professor Peele should undertake the major portion of the work dealing with the present status of standardization in the United States. Mr. Jennings offered to confer with his associates in the Institution of Mining and Metallurgy, in London, while Mr. Corning agreed to devote special attention to these questions in connection with French, German, and Swiss regulations.

At a subsequent meeting on February 19, 1912, the following topics were agreed upon for investigation: (1) Standard engineering ton; (2) Basis for the calculation of tonnage costs, and the relation between production of mine and actual tonnage treated in mill or smelter; (3) Definition of "ore"; (4) Definition of "ore in sight", and its classification; (5) Measurement of ore reserves; (6) Screen meshes; (7) Bases for valuation of mines; (8) Standardization of accounts.

It was decided that Mr. Jennings should deal with topic No. 2; Professor Peele with Nos. 3, 4, and 5; Mr. Corning with Nos. 1 and 7. Discussion of topic No. 6 resolved into the decision to accept the work of the Institution of Mining and Metallurgy on this subject as standard, and so to recommend in the committee's report. It was decided to postpone consideration of topic No. 8 until it could be taken up by all three members.

Owing to the extended absence of Mr. Corning in Chile, and of Mr. Jennings in Europe, the report of Professor Peele is as yet the only one submitted to the committee. Mr. Corning, however, becoming also interested in the definition of "ore," submitted a report thereupon, in collaboration with Professor Peele. The following minutes of the committee are published at this time by request of the council of the Society, for the purpose of eliciting discussion, but with the distinct understanding that its recommendations are by no means final, and that it does not constitute a formal report by the committee. It is mainly the work of Professor Peele, fortified by additional paragraphs from Mr. Corning, where indicated.

DEFINITION OF "ORE."

To assist in arriving at a comprehensive and satisfactory definition, Mr. Corning and I have reviewed the subject as treated in some 24 different works on mineralogy, ore deposits and mining. In our opinion, the best definitions in print are these:

Koehler (Ed. 1903, p. 1).—

> The word "ore," when used in connection with mining, signifies those minerals or combinations of minerals from which metals and metallic compounds can be profitably won on a large scale.

von Groddeck, 1879, and Beck, 1909, p. 1, use substantially the same definition. (For the word "large," I would substitute "commercial.")

von Cotta (Ed. 1859, p. 1).—

> Ores are those minerals and mineral aggregates which, by reason of their metallic contents, attract the attention of the miner.

Phillips ("Ore Deposits," 1884, p. 1).—

> The term "ores" comprises all natural combinations of minerals in which the proportion of metal, after suitable mechanical preparation, is sufficiently large to admit of their being advantageously treated by the metallurgist.

Beck ("Ore Deposits," 1909, p. 1).—

Metallurgically speaking, ores are metalliferous materials; the silent assumption is made, however, that the metallic contents shall not be below a certain percentage, the latter to be determined for each group of minerals. For our purpose, however, this definition of ore must be more closely limited so that only such minerals and mineral aggregates shall be considered as ore out of which metals or metallic combinations can be won with profit on a large scale. [Contrib. by C. R. Corning.]

Kemp (*Trans.* Canadian Mining Institute, 1909, p. 367) after an elaborate review of the various authorities, proposes:

"In its technical sense, an ore is a metalliferous mineral, or an aggregate of metalliferous minerals, more or less mixed with gangue, which, from the standpoint of the miner, can be won at a profit, or from the standpoint of the metallurgist, can be treated at a profit."

"The test of yielding the metal or metals at a profit seems to me, in the last analysis, to be the only feasible one to employ."

Murray's New English Dictionary.—

An ore is a native mineral containing a precious or useful metal in such quantity and in such chemical combination as to make its extraction profitable.

Ries.—

The term "ore" includes those portions of an ore body of which the metallic contents form a sufficiently large proportion to make their extraction profitable.

At the meeting of the committee on Feb. 27, the following definition was proposed, subject to possible revision later:

An "ore" is a mineral or mineral aggregate, occurring in sufficient amount and containing one or more precious or useful metals or metalloids in such quantity and in such chemical combination as to make extraction profitable.

After further study of the subject, I would propose the following:

An ore is a mineral or mineral aggregate, containing precious or useful metals or metalloids, and which occurs in such quantity, grade, and chemical combination, as to make extraction commercially profitable.

DEFINITION OF "ORE IN SIGHT."

After spending a considerable part of June and some of July, 1912, in studying the contributions to the discussion of this subject in the technical periodicals and transactions of societies, I conclude that, while it is not difficult to make a fairly satisfactory statement of principle, it is impossible to frame a definition which will cover all the cases that may be met in the practice of the profession.

The difficulty is, of course, due to the multifarious nature of ore deposits; the almost endless variations in their occurrence and physical form.

It will be well first to enter in the minutes of this committee the best of the definitions and restrictions which have already been formulated.

Edmund B. Kirby was one of the first to urge the importance of this subject. In the *Transactions* of the Denver Scientific Society, 1899, he proposed the following definitions:

> "Ore in Sight" is that contained in blocked portions of the deposit, each of which is so clearly exposed that the limits, continuity and value may be reasonably determined. Such ore is a proven resource and ready for extraction.
>
> "Pay Ore" includes those parts of the orebody which are both rich enough and large enough to stope with profit.
>
> "Probable Ore" includes any blocked ore not certain enough to be "in sight," and all ore which is exposed for sampling, but of which the limits and continuity have not been proved by blocking. Also, it includes any undiscovered ore of which there is a strong probability of existence.

The Council of the Institution of Mining and Metallurgy, Sept. 30, 1902, (*Trans.* of the Institution, Vol. XX., p. 526) decided:

> 1. That members of the Institution should not make use of the term "Ore in Sight" in their reports, without indicating, in the most explicit manner, the data upon which the estimate is based; and that it is most desirable that estimates should be illustrated by drawings.
>
> 2. That, as the term "Ore in Sight" is frequently used to indicate two separate factors in an estimate, namely: (a) ore blocked out, that is, ore exposed on at least three sides within reasonable distance of each other; (b) Ore which may be reasonably assumed to exist, though not actually "blocked out;" these two factors should in all cases be kept distinct, because (a) is governed by fixed rules, while (b) is dependent upon individual judgment and local experience.
>
> 3. That, in making use of the term "Ore in Sight," an engineer should demonstrate that the ore so denominated is capable of being profitably extracted under the working conditions obtaining in the district.
>
> 4. That the members of the Institute be urged to protect the best interests of the profession by using their influence in every way possible to prevent and discourage the use of the term "Ore in Sight" except as defined above; and the Council also strongly advises that no ambiguity or mystery in this connection should be tolerated, as it considers that such ambiguity is an indication of dishonesty or incompetence.

H. C. Hoover.—

> "Positive ore," or ore developed is ore exposed on four sides, in blocks of a size variously prescribed.
>
> "Ore blocked out" or ore exposed is ore exposed on three sides, within a reasonable distance of each other.

"Probable ore" or ore undeveloped is ore exposed on two sides.

"Possible ore" or ore expectant is the whole or a part of the ore below the lowest level, or beyond the range of vision.

"Proved ore" means ore in which there is practically no risk of failure of continuity; "probable ore" is that in which there is some risk, yet warranting an assumption of continuity; "prospective ore" is material which cannot be included in the above classes, nor definitely known or stated in any terms of tonnage.

Krusch ("Examination and Valuation of Ore Deposits," 1907, p. 91.), discussing Hoover's definitions, says:

"Dependent on the mode of ore occurrence, the engineer has the right to assume above, below, and to the side of the lowest workings, a comparatively small belt of profitable ground; for example, in case of persistent, thick veins, or in uniform beds of ore, it would be profitable to assume extension of the ore for an additional distance of 75 ft. beyond the boundaries of the workings....The amount of "possible ore" depends entirely on the judgment of the engineer and strictly speaking should not be expressed in tonnages....It is evident that the distinction between "visible" and "probable" ore is most important and that a *definite statement* as to tonnage of "possible" ore can in no circumstances be considered as anything than most misleading. Therefore, tonnages of "visible" and "probable" ore should be stated separately.

G. M. Gouyard (*Eng. and Min. Journ.*, March 23, 1903, p. 436) gives the following definitions:

"Ore Blocked"—such bodies as are accessible on all sides; that can be accurately measured and thoroughly sampled, and the values of which can be reliably determined.

"Ore Partly Blocked"—those bodies that are only partly developed, and the values of which can be only approximately determined.

"Ore Faces"—those bodies that are exposed on one side, or show only one face, and of which the values can be determined only in a prospective manner, as deduced from the general condition of the mine or prospect.

B. B. Lawrence (*Eng. and Min. Journ.*, Feb. 28, 1903, p. 323) defines as follows:

"Positive Ore"—ore exposed on all sides.

"Probable Ore"—ore exposed on two or three sides.

"Possible Ore"—ore below lowest level, or below last visible ore.

G. E. Collins (*Eng. and Min. Journ.*, March 14, 1903, p. 409).—

I deprecate cast-iron definitions for classes of ore, which will not admit of variation with varying conditions. For example, I object to using the same expressons to denote estimates of ore in a pockety fissure vein and a comparatively regular impregnated bed, merely because both are exposed on one, two or more sides.

Arthur Winslow has made use of terms "positive," "probable" and "possible" ore in his Liberty Bell annual reports for years. Using his discretion and judgment as to the mines he is dealing with, he is far less exacting in his requirements as to number of sides exposed than Argall, Lawrence or the late A. J. Collins. He carries out the principle that the amount of evidence to be required when making estimates of ore-tonnage, and the number and nature of classes into which estimates should be divided, must depend on general conclusions as to the nature and permanence of the orebodies in the mines under consideration, the distance between the workings, etc.

I do not think that any rules can be made which will lessen the necessity for dependence on the judgment of the examining engineer.

Regarding irregularly occurring orebodies, in fissure veins, I venture to state two propositions:

1. It is not, necessarily or usually, good mining to open up such a vein in blocks of 150x300 ft. Each case must be decided on its own merits.

2. Any expenditure in the working of such deposits, beyond the minimum necessary to discover and extract them, may assist good experting. It is not part of good mining.

Morton Webber (*Min. and Sci. Press,* Sept. 16, 1911, p. 353).—

Blocked-out ore can be measured and its net value computed as tangible assets, but the appraisal of the possibilities of vertical and lateral ore extensions can only be computed by inference, and, therefore, an appraisal must be a matter of experience and judgment.

E. H. Garthwaite. (*Trans.* Inst. Min. and Met., Vol. XVI., p. 231).—

A block of ore is considered as being developed or "in sight" when it has three sides exposed, the distance between any two opposite sides (whether levels or winzes) being not too far apart. The result from the three sides is considered sufficient for the estimation of tonnages and values. When, therefore, four sides....have been sampled, the results should give a closer estimation than where three sides only are available.

Philip Argall. (*Eng. and Min. Journ.,* Feb. 14, 1903).—

"Ore Developed."—Absolutely and without variation, ore exposed on all sides.

"Ore Being Developed."—First class, blocks with one side hidden; second class, blocks with two sides hidden; third class, blocks with three sides hidden.

"Ore Expectant."—The prospective value of a mine beyond or below the last visible ore, based on the fullest possible data (clearly set forth) from the mine being examined, and from the characteristics of the mining district.

J. H. Curle. (*Eng. and Min. Journ.,* April 25, 1903).—

In figuring out ore reserves, a mine valuer must take certain risks ....If the ore shoot under consideration is of biggish dimensions and the lode well defined, the engineer is entitled to allow something for good-will. In such a case, I should allow 25 or 30 ft. beyond the face of a drive in good ore; below a single winze I would allow 10 ft, and below two winzes not a great distance apart 25 ft. A similar margin of risk would apply at other development points. If the ore shoot were short, or a series of short shoots, and the lode of a scraggy appearance, I would make no allowance at all. In either case, one would be guided by the condition of neighboring mines.

T. A. Rickard. ("Sampling and Estimation of Ores in a Mine," 1904, p. 52).—

> To express the results of careful sampling and estimation by a phrase which will at once convey its meaning....I suggest: "ore in reserve and ready to be broken," or "ore ready for stoping." This would cover those parts of a mine so cut up by systematic workings as to permit of very close calculations. Next would come the blocks of ground incompletely developed, but known to carry ore, which, in character and persistence, are similar to the main portion of the mine. These could be covered by the terms "probable ore reserves." Beyond this a careful engineer will not go, avoiding "possible ore-reserves," or any similar phrase, as a snare....that may commit him to a meaning which he did not intend to convey....When it comes to the chances of development....it will be best to include consideration of this aspect of the inquiry under the paragraphs (of the report) which deal with "the future prospects of the mine."

J. D. Kendall. (*Trans.* Inst. Min. and Met., Vol. X., 1901-2, p. 143).—

> The ungotten ore of a mine can never be all in sight, even when "blocked out" in the most complete manner possible in the regular working of mines....
>
> If he can see four sides of a rectangular mass of ore, an experienced person can estimate....sufficiently accurately for commercial purposes. In some cases, only three or two sides of the ore mass can be examined; hence, a different factor of safety must be employed.
>
> With only one side of a mass of ore in sight, no one can tell the quantity of ore in that mass....The third dimension, often assumed, can only be ascertained by "blocking out;" so that "ore in sight" may be considered as synonymous with "ore blocked out." By "blocking out" is meant the exposure of ore on two, three or four sides.

T. A. Rickard, (in closing discussion in *Eng. and Min. Journ.*, Nov. 14, 1903, p. 730) said:

> The entire discussion of this difficult part of mining practice illustrates the importance of the insistent element, present in all estimations of ore in a mine, of the personal factor, which can only be expressed by x. No branch of professional work requires more resourcefulness and skill, and it is one of the severest tests of an engineer's capacity.

Conclusions.—It is evident, from the preceding, that marked differences of opinion exist among members of the profession. In summarizing, several points may be emphasized:

1. The expression, "ore in sight," as commonly used in the past, appears to possess so indefinite a meaning as to discredit it completely.

2. In estimating the value of ore in a mine, the character of the deposit must be taken into account and kept clearly in view.

3. The "personal factor," insisted on by some engineers, may and often does convey a substantial meaning to members of the profession; but, to the client, as a rule, the expression can have no useful significance.

4. In stating the resources of a mine, a classification of the ore, known or presumed to exist, is essential.

It is therefore recommended:

A. That the term "ore in sight" be definitely abandoned.

B. That engineers be urged to set forth clearly all the essential facts on which are based their conclusions as to the quantity and value of the ore in the mine.

C. That the following classification be adopted:

I. *Positive ore* is ore which is exposed and properly sampled on four sides, in blocks of reasonable size, having in view the nature of the deposit as regards uniformity of value per ton and of the third dimension or thickness.

II. *Probable ore* is ore which is similarly exposed on either two or three sides. Whether two or three sides be taken as a basis will depend on the character of the deposit.

III. *Possible ore* is such ore as may exist below the lowest workings, or beyond the range of actual vision.

D. That members of the profession be urged to express in separate and distinct items the values assigned to the several classes of ore designated.

Measurement of Ore Reserves.

Mineral deposits are rarely, if ever, of a nature permitting accurate calculation of tonnages and values. Among the exceptional cases are:

1. Many collieries.

2. A few metalliferous veins, of quite regular thickness and value, and of persistent continuity; as, for example, the gold reefs of the Rand and some of the Michigan copper veins.

3. Some massive deposits, of large lateral extent and thickness, such as the "porphyry coppers."

In a few cases, mathematical formulas may be applied for calculating ore reserves and values. But, for most mines, such formulas are useless, because the data are largely indefinite or indeterminate. The best that can be said for them is that they may sometimes serve to steady the judgment of the engineer.

The following references to proposed formulas are presented:

Lee Fraser, *Eng. and Min. Journ.*, Oct. 21, 1911, p. 802.

R. R. Brinsmade, *Trans.* A.I.M.E., Vol. XXXIX., p. 243.

J. C. Little, *Eng. and Min. Journ.*, June 25, 1898, p. 764.

Method at Ray Central Mine, Arizona, *Eng. and Min. Journ.*, Dec. 16, 1911, p. 1179.

N. H. Emmons, *Trans.* A.I.M.E., February meeting, 1912.

There are also a number of papers on the preparation of mine plans, assay plans and delineation of irregular stopes.

Conclusions.—After studying this subject, I conclude that it is not feasible to formulate any method of measurement that would be useful, or of general application.

Three points, however, are suggested, viz:

A. Proper measurements of ore cannot be made without a clear knowledge of dip and strike, in case of a vein or bed; or of the shape of the deposit, in case of segregations, lenses or thick orebodies in general.

B. Whenever applicable, the prismoidal formula should be used for calculating volumes.

C. Illogical precision in stating tonnages should be avoided. Even in the most completely blocked-out ore, there are elements of uncertainty. It would appear that the sensible course is to use round figures to express measurements and tonnages of reserves.

Robert Peele.

New York, N. Y., August 27, 1912.

PERSONALS

Edward H. Benjamin has severed his active connection with the Joshua Hendy Iron Works, and will resume his former practice as consulting mining engineer in San Francisco.

J. C. Branner has been decorated by the Brazilian Historical and Geographical Institute in recognition of his many contributions to Brazilian history and geology.

C. R. Corning has been appointed manager of the Huanchaca Mining Co. in Bolivia.

L. C. Graton has been at Butte, Mont., with a corps of assistants, in connection with his study of the secondary enrichment of Western copper deposits, an investigation to which the large producers of the West have jointly contributed.

George A. Laird, formerly manager of the Candelaria Mining Co., Chihuahua, has been appointed general superintendent of mines of the Great Cobar Mines, Cobar, N. S. W., and left San Francisco for his new post on September 17.

CHANGES IN ADDRESS

Fuller, John T....................Box 393, Little Rock, Ark.
Prichard, W. A..................................Ione, Calif.
Young, George J..Minn. State School of Mines, Minneapolis, Minn.

Mining and Metallurgical Society *of* America

Vol. VI. October 31, 1913. No. 10.

ANNOUNCEMENTS

Delay in Publication.—The publication of this bulletin has been delayed in order that the minutes of the San Francisco section might be included.

New York Section.—A meeting of the New York Section will be held at 8 p. m. on Tuesday, November 18, 1913, at the Engineers' Club, preceded by a dinner (informal) at 6:30 p. m. The subject of discussion will be the flotation process.

New List of Members.—A new list of members will soon be prepared for publication the beginning of next year. Any members who have made changes in their addresses and have not notified the Secretary should do so promptly.

Bound Volumes.—The Secretary has still a few copies of Vol. IV. (1911) of the Bulletin which may be obtained at $1.50 a copy.

Committees.—The President of the Society has appointed the following committees: On mine taxation, J. R. Finlay (Chairman), E. T. Conner and H. C. Hoover; welfare of mine and metallurgical employees, J. P. Channing (Chairman), R. M. Catlin and W. Y. Westervelt.

Revision of the Mining Law.—References have been made in several publications to the effect that the Mining and Metallurgical Society of America has expressed itself with respect to recommendations for a revision of the Federal mining laws. This is not the case. The mining law committee of the society has made a report and that report has been discussed by the New York section of the society, favorably in part and adversely in part. Neither the council of the Society nor the Society as a whole has yet taken any action, the position of the committee's report being merely that it is before the Society for discussion. A communication from Mr. Winchell is published in this bulletin. Members of the Society are urged to take note that the subject is before them for discussion; and that discussion is not limited to the meetings of the organized sections of the Society.

W. R. Ingalls,
Secretary.

MEETING OF COUNCIL

A meeting of the council was held at the Engineers' Club, New York, on Oct. 23. The members present were Messrs. Ingalls, Kemp, Munroe and Penrose. Mr. Leggett was represented by proxy. In the absence of the President and Vice-President, Professor Kemp was elected Chairman of the meeting.

Upon motion, duly seconded, and unanimously carried, the Medal Committee was instructed to arrange forthwith with Tiffany & Co. for the preparation of the dies for the annual medal according to the design and size previously adopted by the council.

The Secretary read the following letter received from the Secretary of the Canadian Mining Institute:

> I notice in the last bulletin of the Mining and Metallurgical Society of America, that the Society has a committee on standardization, and that this committee has now several important matters under consideration. It has occurred to me that it would be a great advantage if standards adopted by the mining profession in the United States were officially recognized in Canada, and I should like to suggest, therefore, the advisability of co-operation in this respect between the Society and this Institute. If this proposal meets with your approval, I shall immediately ask my council to appoint a committee on standardization, having authority to act in concert with the committee of the Society. No doubt many of the members of your Society are also members of our Institute, and would, therefore, be especially qualified to act on a Canadian committee. Meanwhile I am endeavoring to select subjects for general discussion at our annual meeting next year, and it would certainly be very much to the point if such work as you are now considering, for example, "The standard engineering ton; the calculation of tonnage costs; standardization of accounts," etc., could be presented for

discussion at this meeting, and resolutions adopted endorsing the decisions arrived at by our Society.

Upon motion, duly seconded, and unanimously carried, the communication of the Secretary of the Canadian Mining Institute was referred to the Committee on Standardization with a request for its advice respecting the suggestion.

The Secretary reported receipt of the following communication from H. H. Knox, a member of the Society:

At the last meeting of the New York section of the Society you announced that the council had decided to award the gold medal for distinguished contributions to the literature of mining and invited suggestions from the members concerning the award.

The phrase "distinguished contributions to the literature of mining" is ambiguous, in that it is not clear whether excellence in literature or advancement of the art of mining is to be emphasized, though it must be assumed that the latter is intended.

Since all will agree that the medal is intended as a recognition by the profession of those men who have most contributed to the advancement of the arts of mining and metallurgy, it is my belief that this object could be best accomplished by establishing a system which if once adopted by the membership would lead to a far closer approach to unanimity than would be possible if the award should be bestowed haphazard. The system I propose is as follows:

A. Fundamental Sciences.
  1. Geology and Physics.
  2. Chemistry.

B. The Arts.
  1. Mining Engineering.
  2. Concentration.
  3. Dry Metallurgy.
  4. Wet Metallurgy.

C. Literature, historical, technical or legal.

If the council would adopt some such system and announce it to the membership it would have the advantage that in course of time the whole field would be covered and that the attention of the members could then each year be concentrated on a definite group of candidates.

Personally I believe that those should be first honored who have contributed to the advancement of professional knowledge in the field of pure science and that precedence should be accorded to some such eminent economic geologists as Spurr, Lindgren, Kemp, Van Hise, Winchell or De Launay. This would be especially appropriate since the field of pure science usually commands a smaller material reward than is offered by success in the industrial arts. I propose the name of J. E. Spurr.

Mr. Knox's communication was referred to the Medal Committee.

Upon motion, duly seconded, and unanimously carried, the Secretary was instructed to drop from the membership roll the names of all the members owing dues previous to 1912.

W. R. INGALLS,
Secretary.

MEETINGS OF SECTIONS.

NEW YORK.

A meeting of the New York Section was held at the Engineers' Club, New York, on Thursday, Oct. 23, about 35 members being in attendance. The subject of discussion was the hydrometallurgy of copper. The report of this meeting was not received in time for insertion in this bulletin.

SAN FRANCISCO.

A meeting of the San Francisco section was held at the Hotel Oakland, Oakland, on Monday evening, Sept. 15. Present: S. B. Christy, Robert E. Cranston, C. W. Merrill, E. B. Kimball, P. R. Bradley, E. L. Oliver, H. F. Bain, F. L. Ransome, and A. C. Lawson. Prof. Christy acted as chairman.

The Chairman.—We have been called together at this time, at the request of several members to consider the action of the directors of the American Institute of Mining Engineers in rejecting the proposed plan for amalgamation of the Mining and Metallurgical Society with the Institute. You remember that a joint committee was appointed, and that the committee reported favorably on the proposal. When I was East this summer I found considerable opposition to it on the part of the Institute; several members proposed to have a referendum vote, and the directors finally decided it unfavorably. We received notice that the board of directors had resolved that, while at one time it might have been advisable to make the amalgamation, they thought that the time had passed, and that it now thought it better that each society should go along peaceably on its own path.

Several members requested me to write to President Chance and ask his views in the matter. [The letter was read in full, but as it contained some personal matters, only the concluding portion is here reproduced.]

I do not entirely agree with the statement that the Society has accomplished the main purpose for which it was organized, nor with the opinion that it is our duty to uphold the Institute by making the Institute the sole engineering organization of the profession.

Some of us think that the objects of the Society have been attained in part only. Our duty, as I conceive it, is neither to the Institute nor to the Society, but to the interests of the profession, to our professional fellows. Whether one's fealty should be pledged to one or to the other organization, or to both, would seem to be a matter to be decided by the judgment of the individual. I see no reason why we may not consistently maintain membership in both organizations and work for the prosperity and advancement of both. Those advocating union with the Institute aimed to preserve and perpetuate the Society; not to abandon it, but to increase its value and sphere of influence. Many members of the Institute maintain membership in other technical engineering organizations, because they feel the need of association with other engineers in an organization in which membership bears some relation to professional standing. If membership in the Institute had the same professional significance as membership in these other organizations, one of the reasons for the continued separate existence of the Society would not exist.

Whether further negotiations with the Institute are desirable, or whether union with the Institute under any plan can now be entertained, are matters for consideration and determination by the members of the Society. The officers and council of the Society will adjust their policy in this, as in other matters, to carry out the wishes of the members of the Society.

During the last eight months, the activities of the Society have been held in abeyance pending action by the Institute upon the proposed union. One of the questions which are suggested by your letter, and which may now well be placed before the 240 members of the Society, is as to how the situation to-day differs from that confronted by 100 members of the Society four years ago. The answer to this question may probably be a determining factor in deciding the future course of the Society. It seems to me that the important issue which your letter raises, and which thus will come more or less directly before the Society for consideration, if not for discussion, is whether we shall now rest content with what has been accomplished, relinquish our charter, and dissolve the Society, or whether we shall pledge ourselves one to the other to work together to increase the prestige and enlarge the membership of the Society.

Mr. Ingalls had an editorial on this subject in the *Engineering and Mining Journal.* It was very moderate in tone, as was also that of Mr. Bain, in the *Mining and Scientific Press.* Both deprecated the action, and thought it was very unwise.

Mr. Bain has some suggestions, I am sure, as he feels very strongly about it.

H. F. Bain.—My only suggestion is to regard this as ancient history. I think it ought not to have happened, and the only thing to do now is to go ahead and make our own plans.

The Chairman.—Mr. Ingalls in his editorial said that the dues of both societies were so nominal that it did not make any particular drain on the members' purses, but the management of our Society made a considerable drain on the time of the members. The whole matter is complicated by the move that the Institute has now made in creating a chapter in each part of the country. They have already organized six or eight, and it seems rather doubtful whether two active societies of the same sort can coexist. The weakness of the Institute is that it has no standard for membership. If the Institute took the ground that it would recognize some sort of a professional standard for membership and if it then recognized the right of such persons to act on public questions the situation would be different. As a matter of fact, the Institute has refused hitherto to do either of these things.

H. F. Bain.—I would call attention to the fact that a standard of membership is a matter not considered by the Institute at its last meeting. If the Institute does make a classification of its membership, then we can take the matter up, but it seems that ours is the only society that has a standard, and it is our duty to keep up the work of the Mining and Metallurgical Society until the Institute does make that move.

The Chairman.—One difficulty is that our Society includes only a small portion of the engineers eligible to membership, and the others feel that the Mining and Metallurgical Society has been disloyal to the Institute, and has injured it. That I find from frank talks with many of its best members.

H. F. Bain.—Those men are eligible to membership in this Society, if they want to come in; it is for them to establish some such standard in the Institute, and until they do that, part of the work of the Mining and Metallurgical Society has not been accomplished. The question is, do we consider a standard of membership of sufficient importance to warrant a separate organization, as we did when this Society was founded?

A. C. Lawson.—The reason for organizing then is all the more a reason for maintaining the organization to-day. There are plenty of good engineers in the country who ought to be in this Society, and we have made a mistake in not getting them to become members.

P. R. Bradley.—Would not an active campaign for new membership be a campaign against the Institute?

H. F. Bain.—I think it would be so interpreted. Instead of an active campaign for new members, what is called for, in my opinion, is some general resolution to the effect that, regretting this failure of negotiations, our Society proposes to welcome to membership any engineers who think our ideals worth while, and want to enter our ranks. That might be put in the form of a motion from the San Francisco section.

P. R. Bradley.—It might be made more emphatic by stating that in view of the negotiations for affiliation with the Institute, the campaign for membership had practically ceased; but now that those efforts have failed, it behooves the Society to renew its activity in getting new members.

H. F. Bain.—I would not do that; I would not do anything resembling an active campaign of retaliation or anything of the kind. All we need to say is that we believe, for our part, that there is a field of usefulness for our Society, and that if any of the Institute members feel the same way, we shall be glad to welcome them.

A. C. Lawson.—I move that Mr. Bain be requested to draft such a resolution and present it to this meeting this evening.

[The motion, duly seconded, was formally presented and carried.]

A. C. Lawson.—It seems to me it would be quite consistent with the spirit of the proposed resolution, that this section should appoint one or two of its members as a committee on membership to look over the field occupied by this section and see what candidates might in a proper way be invited to join the Society. I move, therefore, that a small committee on membership be appointed to perform the usual duties of such a committee.

[The motion was formally presented and carried.]

The Chairman.—The Chair will appoint Mr. Bain, Mr. P. R. Bradley and Mr. Oliver. Of course, anybody who has a suggestion can submit it to the committee. I think, however, it will be advisable to ascertain beforehand that the person proposed fulfills the requirements for membership; for it would be very mortifying to suggest a person and find out afterwards that he was not eligible.

A. C. Lawson.—I also move that the Chair appoint a committee to draft a program of meetings and discussions for the coming winter, and to have power to act in issuing programs in the absence of the chairman.

The Chairman.—Before putting that motion, I will state that we have no secretary, officially, but Mr. P. R. Bradley has kindly consented to serve; I should recommend that the appointment be confirmed at this meeting. The understanding is that if he is absent somebody else in his office shall act for him. It is absolutely essential that the secretary should be in San Francisco.

A. C. Lawson.—I take pleasure in nominating Mr. Bradley.

[Mr. Bradley was here formally elected secretary.]

The Chairman.—It has been moved that the chairman and the secretary act as a committee on program for the winter, with power to act.

[The motion was carried.]

A. C. Lawson.—It might be agreeable, Mr. Chairman, to have some expression of opinion as to the general character of our programs; whether technical papers or those on the profession in general would be of most interest to the membership.

C. W. Merrill.—I think they should be ethical questions, without doubt.

The Chairman.—When this Society was organized it was designed to fill a gap which the other societies had left open. I see no reason, however, if anybody has anything of technical interest to say in connection with the profession, why it should not be presented. I do not think that formal papers on such subjects would be in order, but discussions would be very interesting.

Mr. Bain then submitted the following resolution:

WHEREAS, The negotiations for affiliation of this Society with the American Institute of Mining Engineers have terminated unfavorably; and

WHEREAS, We believe that there is a field of usefulness for the Mining and Metallurgical Society of America in that it bases membership upon definite standards of professional attainment; is so organized as to permit formulation and expression of opinion upon public matters of interest to the profession; and for the friendly discussion of ethical and technical problems related to the profession;

RESOLVED, That it is the sense of the San Francisco section of the Society that our organization be maintained, and a cordial invitation to join be extended to those members of the profession who agree with us in considering these matters important.

[The motion was formally carried.]

The Chairman.—The suggestion of Mr. Bain that each one present give a brief account of his summer's work, for this evening, is a very happy one, as we have a number here who have some interesting things to talk about. I will ask Mr. Cranston if he wishes to give us some account of his visit to Colombia:

Notes on the Alluvial Gold Deposits and Emerald Mines of Colombia.

By R. E. Cranston.

The Magdalena is a very large river, running northward in Colombia, navigable for about 1,000 miles, with the exception of a space of about 60 miles, where one must go around some rapids which are not navigable. The tributary streams of the Magdalena river drain a large mining district which has been productive, mainly in gold, for three or four hundred years. The main tributaries which have been worked are the Cauca river and its tributary, the Nechi. The Bartolome, another tributary of the Magdalena, has also produced considerable gold. The methods employed by the people of Colombia are primitive. I saw in one place on the upper Bartolome 150 to 200 natives working in the river with "bateas." They formed a sort of company, working on a royalty basis; part of them would break down the bank of the river and the rest would use the river as a sluice box, dividing the profits. I believe there were 200 persons, men and women, working in the river in a space of 100 yards. What they got out of it I can not say.

The transportation facilities in that country are better than are found in a great many places. The river being navigable for such a great distance, river steamers are used extensively. The country is nearly flat for 300 miles from the coast, and then the northern slopes of the Andes rise gradually to five or six thousand feet, a hundred miles further inland.

The country rock is mainly schist, with a little slate and shales, and granite intrusions. There are a great many gash veins of quartz in the schists with now and then more persistent forms. The valuable mineral found is mainly gold; the depth to which these quartz veins have been worked is not very great. The deepest mine I saw was 700 ft., where they were working in a zone of secondary enrichment, the top two or three hundred feet being comparatively barren. Then the secondary minerals came in for three or four hundred feet, from which zone the profit was derived. The number of profitable mines of any great size in Colombia is small, possibly four or five lode mines, and I saw only one operating placer property of any great magnitude. At the Pato mines there one modern dredge is working and the property is equipped with a power plant capable of furnishing power for three dredges. The future of this country depends a great deal on further development. I do not think enough work has yet been done to ascertain its real value.

In the vicinity of Bogota is an extensive emerald field which is said to have produced many stones of great value. Most of those I saw were flawed. They occur in veins in the schists, the matrix being composed of schist, quartz, and feldspar, with the hexagonal prisms of emeralds scattered through it. The emerald mines are a government monopoly, leased to an English corporation, on a royalty basis. This royalty has been quite a source of revenue to the government, but whether operations are profitable to the English company I do not know.

The climate in the high mountains is very good indeed and the country is beautiful. The insects are less plentiful and the temperature is moderate, the nights being always cool; but in the lowland, below fifteen hundred or two thousand feet, it rains nearly every night and the sun is out in the day time. The temperature is not excessively high but the humidity is so great that the heat is oppressive. I never have been in a country where I felt so hot as in Colombia. Medellin is about 4,900 ft. high. Bogota is at about 9,000 ft. elevation, and must have a good climate. It rains at certain seasons of the year, and it is cool and damp at other times, but it is a relief from the extreme heat of the lowlands. The insects are worse than the climate.

The Platinum District of Colombia.

By E. B. Kimball.

The principal platinum producing area in Colombia is located in the western part of that republic, in the district drained by the Atrato and San Juan rivers. The former flows south, emptying into the Gulf of Darien, while the latter empties into the Pacific Ocean, not far from the Port of Buena Ventura.

This section is west of the Andes Mountains, in the low foothills composed of sandstones and shales under 1,000 ft. of elevation, and is well covered with forests. The section I visited on the Atrato river and its tributaries to the south of the old trading center of Quibdo, is well wooded and has a very heavy rainfall, which prevents the natives from reaching bedrock on any of the larger streams, except in a few places during the so-called dry season.

Most of the primitive mining is done by natives, descendants of the African slaves brought over by the Spaniards to work the mines during the sixteenth and seventeenth centuries. Comparatively few men are engaged in this work. Women and children select favorable spots on the upper end of a river bar and scrape the upper foot or so of gravel into large wooden "bateas," washing the gravel in the adjacent streams. In this way, areas amounting to several acres in extent are worked over every year by the same body of natives. In a few instances, the same area may be worked twice a year, the bars being enriched by gold deposited during the heavy storms. While both gold and platinum are recovered by the natives whom I saw engaged in mining, I estimated that the gold constituted more than 90% of the total recovery of precious metals.

In addition to working the gravels on the head of the bars, occasionally an attempt is made to work the gravels in the streams during unusually dry seasons. A native will dive down to bed rock, fill the "batea" with gravel, and then carry it up to the surface. Sometimes it is necessary for the native to come to the surface once or twice during this operation. The only place where I saw this class of work carried on, was on the Andegueda river, about 40 miles south of Quibdo. The natives also work the older gravel beds found in the adjacent hills. The gravel from some of the richest of these deposits is carried in "bateas" on the heads of the workers to the main streams during the dry seasons, but ordinarily the work on these deposits is confined to the rainy season, where there is plenty of water available in the immediate vicinity. So far as I could learn, gold and platinum occur in the same proportion in these older gravels, namely, 90 and 10%, respectively.

Armenian traders purchase the gold and platinum from the native workers, usually paying a high price for them and giving in exchange various goods, for which exorbitant prices are charged. Several attempts have been made to send platinum purchasers into this field, but all have failed to secure any large amount of platinum, as the Armenian traders immediately offered more than the intrinsic value of the precious metals, while at the same time raising the value of the goods given in exchange. In this way, their competitors were compelled to withdraw, as they were not equipped for bartering.

It is rather remarkable that a district which was extensively worked by the Spaniards from the time of their discovery of gold in the sixteenth century until they were driven from Colombia when that republic gained its independence, should still be a producer of gold and platinum. Quibdo, during that time, was one of the principal gold markets of the new world. Originally only the gold was saved, the platinum being thrown away. Not until the production of gold commenced to dwindle was a small price given for platinum, not so much for its intrinsic value, as an inducement to keep the miners at work producing gold.

The gold and platinum existing in these gravel deposits must have been eroded from the veins along the flanks of the Andes Mountains. Owing to the limited time at my disposal, I did not have an opportunity to visit any of the mining districts located in the Andes, although I was shown rich specimens of gold-bearing quartz, and one specimen of a basic, igneous rock, probably a peridotite, carrying native platinum, the latter occurring in small flaky particles.

The platinum found in the sandstones and shales must have been left on the hillsides and benches after the older gravel deposits had been eroded. These older gravels were undoubtedly deposited by large streams, as heavy gold and platinum nuggets are frequently encountered in them. The largest platinum nugget weighed a little over a Troy pound, but usually a platinum nugget weighing as much as an ounce is considered large.

Pyrites Deposit in Plumas County, California.

By P. R. Bradley.

I recently saw a rather interesting deposit of pyrites in Plumas county about which I would like to ask a question of the several geologists here this evening. Those who have studied the genesis of the deposit at Leona Heights assured me that it is a result of a downward leaching of pyrite which occurred primarily in a flow of rhyolite. It occurred to me that this Plumas county deposit was also the result of downward leaching. It consists of a series of small quartz stringers in the bedding planes of the slate, which stringers originally contained a great deal of copper in some form; in just what form is hard to say because it has been all leached out, and wherever the honeycomb quartz is found but little indication of iron is left. One shaft 100 ft. deep was sunk under a very large outcrop and although the mineralization at this point extended over a width of a 100 ft., at the bottom of the shaft it was only 15 ft. wide; another shaft 200 ft. deep, sunk under a large surface showing, did not find anything at all, proving the superficial nature of the deposit. I was told that the neighboring high mountains are chiefly granite and that among these are a great many quartz veins carrying copper sulphide; also that the granite itself carries more or less copper sulphide. I can not verify these statements. I should like to learn whether this deposit might have originated from the leaching of the silica and copper of the overlying rock, and a subsequent deposition in the slate. There did not seem to be any appreciable accumulation or enrichment anywhere. The copper in the lower part of the mine had every appearance of being secondary, as you might expect to find it, but there was no considerable concentration there. There may have been a dissemination, but no concentration.

A. C. Lawson.—At Leona Heights the material consists of a body of rhyolite which locally contains a great deal of pyrite, and in many places, particularly in its southern extension, the rock is deeply oxidized, and shows a nearly white or yellowish color; under these bleached portions they are actually mining bodies of pyrite. Mr. Whitman, who has been the most competent student of these deposits, recently came to the conclusion that the orebody is the result of a downward leaching of the pyrite from the upper part of the rhyolite, and a precipitation in the lower part. In confirmation of this, he made a number of experiments with a series of tubes, through which, for five months he allowed very slightly acidulated water to percolate at the rate of a drop a minute, passing through iron pyrites. The water apparently acted on the pyrites and carried down sulphate of iron. Below this zone he placed some reducing agent, such as various forms of carbon and other things; and below this zone of reduction, he placed a zone of powdered kaolin. At the end of five or six months he found that a teaspoonful of pyrite had been formed, practically proving that pyrite can be formed by vadose circulation, as it is likely to occur in nature. The temperature was the temperature of the room, except in one of the tubes which was kept in a box warmed by a continuously burning incandescent lamp. The pyrite was formed, not at the place of reduction, but in the tube containing kaolin. The pyrite was found in little groups of crystals displacing the kaolin; the largest of these crystals was about 0.1 in. on the edge. The others were much smaller. He thus seems to have substantiated the formation of pyrites by vadose waters. I have no doubt that a great many ores are formed in the same way; and I do not think there is anything surprising in the accumulation and concentration of pyrite in the way you describe, the sulphide being derived from the older formation. The results of his experiments have been published in *Economic Geology.*

The Chairman.—I have often found the best pyrites crystals in cavities filled with a slimy clay. The crystals evidently made way for themselves, forcing out the clay.

H. F. Bain.—I have seen crystals of various minerals which have grown into the clay. The laminations were bent around the crystals, so indicating that the pushing aside of the laminations by the crystals had been mechanical.

Desulphurization of Cobalt Silver Ores.

By H. Foster Bain.

While attending the International Geological Congress last summer I visited Cobalt, in company with Prof. Christy. What most interested us there, was a process for desulphurizing ores, which was shown to us both in confidence; and I have just obtained permission of the authorities to make the information public. Last year a most notable success was attained at the high-grade mill of the Nipissing Mines Co., built under the guidance of Charles Butters, of this section of our Society. The research upon which the new process is based was carried out by Mr. J. J. Denny, who is metallurgical chemist of the Nipissing Company. The process, like all the others worth while, is very simple. At Cobalt they mine very complex silver ores containing nickel, cobalt, arsenic, antimony, and bismuth, besides sulphur. If you take a dish made of pure aluminum and put into it a solution of KOH, and then drop in a bit of this ore, you can watch the ore decompose. What happens is that the aluminum reacts with the KOH, releasing nascent hydrogen, which breaks down the sulphides and leaves the metals in a spongy mass. Mr. Denny took advantage of this series of reactions to develop a process which consists, in effect, of crushing in alkaline solution, dewatering as much as possible, and then agitating in large tanks around the sides of which are plates of metallic aluminum. They thus obtain a solution of caustic soda and a pulp which contains the silver and the other metals. They run that through a filter and draw out the caustic solution, thereby obtaining a pulp containing the metals. In that condition, the pulp is mixed with cyanide, re-agitated, run through the filter the second time, and the solution is then precipitated in the ordinary way.

How widely applicable this process may be it is too early to say. The day I was there we had some small pieces of telluride gold ore, which Mr. Denny experimented with; it seemed to break up quite readily. He has also tried the process on sylvanite, and apparently it works as well as the complex sulphides. The process has been in use for a number of months, and they are now handling a large quantity of material. They have worked out the mechanics of the process as well as the chemistry, and the cost is roughly between 40 and 50c. a ton.

The Chairman.—As I understand it there is a formation of sulphide of potassium, possibly also sulpharsenide, etc., of potassium; these remain in solution and have to be got rid of before cyaniding, for this reason it is filtered by a Butters filter before the cyanide treatment. They told me that they found it best in reducing the ore by aluminum and caustic potash to run it through a tube-mill containing aluminum balls.

H. F. Bain.—They now find it best to run the ore through a tube-mill lined with aluminum bricks.

C. W. Merrill.—We happened to know about this process through our representatives in Canada, but we did not know all of the details which you have given us tonight. I myself am wondering just what function the aluminum plays. A good many years ago in the Black Hills two of our chemists, working under my suggestion, took what is known as the telluride ore of that district and by treating it with caustic soda, completely eliminated the sulphur; after filtering off that solution, presumably containing sodium sulphide, we made a very rapid and quick extraction of the gold by cyanide. The only reason that the method was not put into practice was that we did not find enough of this ore in any one deposit to make it profitable. We used about 2 or 3 per cent. solution, and found we could effect a considerable economy by using carbonate of soda, which is much cheaper than caustic soda.

Recent Work of the Geological Survey in the West.

By F. L. Ransome.

I have recently been given general charge of the Survey's geological work in the West, and also of the study of metalliferous deposits, and most of my work last Summer was an attempt to learn something of that branch of which I know least, the general geological work in the West. Hence I have been making trips with various parties, beginning with J. S. Diller in Northern California, who has just finished a geologic map of the Weaverville quadrangle. The Weaverville region contains large deposits of low-grade gravels which, in their original state, are being worked in LaGrange mine, and also enriched deposits or concentrations from these original deposits along the present streams, which are being worked in a smalled way. From there I went to the Napa region, where C. E. Weaver has been doing some geologic mapping. He is not a member of the Survey, and has been doing that work at his own expense with the idea of turning it over to the Survey for publication; in fact, he has already turned over part of it.

In the Yosemite region F. C. Calkins and F. E. Matthes are studying particularly the geology of the Valley and the vicinity, Mr. Matthes specializing on the glacial geology, with a view ultimately of issuing some folios in that region, but with the immediate purpose of getting out a publication to meet the large demand expected at the time of the Exposition here. We hope that a great many people will go into the Valley, and we shall try to issue a publication which will be interesting, not only to the geologist, but to the educated among the tourists. From here I next go up to the Sumpter region in Eastern Oregon, where we are completing a folio in co-operation with the Oregon Bureau of Mines and Geology. Mr. Katz of the Geological Survey is doing the work there. Then, in Northeastern Utah and Southern Wyoming and Idaho, in connection with the examination of phosphate lands, we got the material for two geologic folios. In the Haley region of Idaho, L. G. Westgate is working under a special arrangement of the Survey on the general geology, and J. B. Umpleby on ore deposits. This region was visited many years ago by Mr. Lindgren, but his report is now rather out of date. From there I go to the Black Hills, where we have a number of geology folios partly completed, waiting particularly for the study of pre-Cambrian geology. Sidney Paige is now working there, and expects to finish the four quadrangles this season. That covers my own experiences of the year, which has not been very closely connected with mining geology. In fact, I have been obliged temporarily to set aside my own work in Arizona, in connection with Miami and Ray, on account of these general duties.

Gold and Coal Mines of Nova Scotia.

By A. C. Lawson.

Nearly my entire Summer was devoted to attending the International Geological Congress in Toronto. The excursions in connection with the Congress were very well managed, and were very successfully carried out at a minimum of cost to those participating in them, and with a world of advantage to the persons who availed themselves of the opportunity. Starting out nearly a month before the session, I went down to the Maritime Provinces, to Gaspé and over Nova Scotia and New Brunswick, a country I had never visited before. After that I spent five or six days in the region of Thetford, Quebec, visiting the asbestos deposits there. After the sessions of the Congress at Toronto, between August 7 and 14, there were excursions out through the West, and up to the mining country of Ontario, which were also carried out with a very high degree of success.

One might refer to many matters of interest to the mining profession, but I will speak first of the gold deposits in Nova Scotia, which we had an excellent opportunity of seeing. The gold of Nova Scotia occurs in quartz veins as free gold of very remarkable purity, being the highest-grade gold known anywhere. The veins are lenses, tapering in width from a few feet to nothing, lying in the stratification planes of certain sedimentary rocks, apparently sandstones and shales, now more or less metamorphosed by granitic intrusions. Apparently prior to the intrusion the rocks had been folded rather regularly into anticlines and synclines, which were remarkably symmetrical, while the gold veins lie very systematically and regularly in the anticlinal structure. In ground plan of the surface one can follow the folded structure of the bed in great detail with a succession of veins outcropping with the strata, thickest on the axis of the folds and thinning away on the flanks. In other words, they have the structure described by Rickard at Bendigo as saddle reefs, only on a very much larger scale. Some of the mines are quite successful, and their owners have made a good deal of money out of them. But they are all puttering mines; I did not see a good shaft in the whole country. As they sink on any of these anticlinal folds and cross folds, they get one level below another, and a shaft properly made will answer for all these various levels, but I think there is not one systematic shaft which has attempted to do that. Hence, it seems to me that there is an opportunity in that country for the sinking of systematic shafts which would tap a great many of these veins and work out each of them. None of the mines is down more than two or three hundred feet, but the anticlines seem to go down indefinitely, and judging by the surface indications the quartz veins are numbered by the score.

We also saw the great coal deposits of Nova Scotia and Cape Breton. The coal there is interesting by reason of the fact that the seams are so thick that they have great trouble in working economically. In the Pictou field is one seam 16 or 17 ft. thick, which cannot be mined in one operation. Hence, they mine the upper 8 ft. and let the roof rest on a crib-work of timbers; in a short time the whole area settles and crushes the timbers down to the thickness of about one foot. After they have thus excavated a suitable area 8 ft. thick, they again begin at the top, having these crushed timbers as a roof, and take out another 8 ft. The engineers are in difficulty because this is a very bad roof to work under, being very hard to hold. This is a mining engineering problem of the first magnitude, because the coal is extremely valuable and some method has to be devised for getting it out economically. They are not making nearly so much money out of that coal as other mines having seams 4 to 6 ft. thick. The seam outcrops at surface and descends as much as 2,500 ft.; the rock is shales and sandstones, and has not much sustaining ability. There is another seam of coal which is as much as 37 ft. thick.

In Cape Breton the seams of coal extend out under the Atlantic, and it is interesting to know that they have to be informed absolutely of the character of the sea floor for two miles out; this they have learned by sounding. For a distance of two miles the amount of sand is small, and rock is found almost everywhere. They once lost a mine by flooding, and on investigation they found that where the cave occurred there was an old channel, having 600 ft. of sand there in it. Since then they never mine under the sea without knowing what kind of an ocean floor was over them.

I was at Cobalt seven years ago, but I did not go this time. The district is extremely interesting from recent ideas which Mr. Tyrrell has advanced as to the causes of the fissures at Cobalt, and their probable distribution. You are aware that the fissures are relatively shallow, and while they are sometimes very rich they are also narrow. You recall that they are all related to an inclined sill of diabase. The veins occur only in the vicinity of that sill or in the sill itself. Mr. Tyrrell has advanced the idea that the fissuring in that region is due to the shrinkage of the sill as it cooled; that the shrinking of the sill would be somewhere in the neighborhood of nine inches in the thousand feet of length, which is approximately the amount actually observed. He thinks that the fissuring has also affected the roof and floor of the sill and that all the fissures are in the nature of gashes. It is interesting to note that this idea of Mr. Tyrrell's has been in some measure verified by recent developments; they have found ore in the ground where it was anticipated according to the theory. If it is still further verified, it will negative the idea that has been voiced particularly by the late Mr. Emmons that these orebodies are the result of a long continued process of secondary enrichment of veins extending up in the rocks above the present surface. If Tyrrell's idea is right, there never were very extensive fissures extending into the rock above, and therefore there could not very well have been a notable amount of secondary enrichment.

The conditions at Cobalt are also interesting from the point of view of the function of magmatic waters in the formation of ores. A number of papers have appeared in which the idea has been suggested that the ores were derived from magmatic waters; and yet those who advocate that idea do not reflect that the point of extrusion from the main reservoir is far removed, it may be many miles, and the fissures are nowhere connected with that vent. The fissures were formed after the diabase was solid; hence it seems impossible that the filling of fissures, whether in the sill or in the rocks above or below, could be due to magmatic waters, because the vent is so far away from the place where the fissures are now found.

Diamond-Drill Prospecting at Porcupine.

By S. B. Christy.

This Summer I happened to be over very much the same ground that was covered by the geological congress, and took advantage of an opportunity to pay a visit to Porcupine, Cobalt, and Sudbury with one of my former students, W. W. Mein, who is consulting engineer for the International Nickel Co. Many things impressed me very strongly. One was the usefulness and also the difficulty in certain cases of prospecting with a diamond drill. At the Dome mine, which is in a schist formation, they have prospected a good deal with a diamond drill, and it has been very difficult to interpret with certainty the records from the drill. I remember one hole particularly, which went down at about 60 deg., perpendicularly to the supposed dip, and apparently exposed a body of ore two or three hundred feet thick. There was another nearly vertical hole almost intersecting the first one, which showed only about 20 ft. of ore. Apparently the first hole had gone down on the dip of the vein. They have not been able to determine any definite system in the fissures, only that a certain zone seemed to be very much richer. They have also found it difficult to sample the rock and the ore. They push drifts as far as there is any indication of ore and the sample is taken by a process of continuous sampling. A strip is cut continuously on one side of the drift, and wherever any indication of a change of formation is seen, that sample is separated and its position marked and it is assayed. Thus they plot the values of these different drifts by a system of continuous sampling; the sample is not taken at intervals but along the whole course of the drift. In that way they have been able to check very closely the actual contents of the orebodies, as determined by milling work; in fact, the mill gives a little higher result than the sampling.

The mines at Porcupine are not very deep; most of them would be considered very shallow in the West. The Dome company is able to mine and mill its ore for about $4. It has 40 stamps now, and expects to double that number and further reduce expenses. The diamond drill has been very successful in prospecting the massive deposits in Sudbury and Copper Cliff, and all through that district. They can determine the size and shape of orebodies with great certainty, and they are doing a lot of work of that sort. One company has six or eight diamond drills at work all the time, and another has thirteen. These formations at Sudbury are massive, and there is a chance for a diamond drill to strike something of some size.

I also visited a couple of large mines this Summer, the Homestake and the Utah Copper, and the thing that impresses me most is the great change that has come about gradually in American mining methods. Formerly, mining was defined by a distinguished French engineer as the art of avoiding excavation; and the best miner was one who, like the Mexican, could follow a stringer with least amount of excavation. That was formerly considered the standard of good mining. At the present time, Americans seem to be intent on making mining so cheap that everything can be mined and milled. That is the way in which the Homestake is proceeding, and also the Treadwell mine, and other new mines near Juneau, while all the porphyry copper mines are working on that basis.

I do not know anything that is more impressing than the boldness and skill with which such a mine as the Homestake is operated. I was in a chamber orignally 110 ft. high, 410 ft. long, and 60 ft. wide, and with the exception of some of the ore that was broken and being drawn, and some of the filling, which was coming in as the ore was removed, it was a single large chamber with walls apparently as solid as the Rock of Ages. It was being worked with perfect safety to the men, the air was cool, everything went on like clock work, and the secret of success was that the method was so cheap that everything could be taken as it came.

That is also the plan on which the Dome mine is operating now. Mr. Mein had men sorting some of the rock, but it all looked so much alike that the miners could not be trusted to separate ore from waste; so he had some of his skilled samplers try the sorting as an experiment, but it was so difficult to do it, and the probability of throwing away good ore was so great, that it was considered better policy to try to reduce the cost and take everything that comes, because they find that rock which does not pay frequently contains stringers that are very rich. When you see in some of the porphyry copper districts, one mine handling nearly as much ore and waste each day as is handled at the Panama Canal, it makes you realize that the open-cut method of mining has also been brought to a high degree of perfection.

E. B. Kimball.—Is there as great a difference in values at different places in the Dome as there would be in the Mother Lode?

S. B. Christy.—About the same. Once in a while at the Dome they get into good rich ore; they find specimen rock, not frequently, but occasionally.

C. W. Merrill.—I would like to say a word in respect to the diamond drill at Dome. While a good many of the results have been disproved by subsequent prospecting, still if they learned nothing more than the direction of the ore the diamond-drill work has not been wasted.

S. B. Christy.—I did not mean to say that the work had been wasted. The only trouble is that the drill cannot, like the Irishman's gun, "shoot around the corner." The diamond drill can strike only—I was going to say—in a straight line, but we all know it cannot even do that. It sometimes changes direction when we do not want it to, and goes to places where we do not expect it. In this connection, I remember the case of a copper mine in Michigan, one of those mines in diabase where the ore occurred in great nodules, sometimes as big as a table, and distributed through the rock in a very irregular manner. One company took hold of the property, drilled it quite thoroughly, and gave it up. Another company took it over and found some of those drill holes going right by the big bodies of ore. At the Dome mine, the diamond drill has given a large amount of information that could not be gained in any other way. It is sometimes difficult, however, to interpret the results of the diamond-drill work, that country being so cut and cross-cut with small veins.

C. W. Merrill.—I should like to say a word, too, about the difficulty of sampling of which you speak. I have watched the Dome from its inception. It is more difficult to judge sampling there than at any mine I know. On some days you get $10, and then 80c. the next day. It is a fact that the law of averages shows the advisability of this very careful sampling, the result being that the difference is only about 60c. between what the sampling indicated and the actual results.

On motion of Mr. Bain, the meeting adjourned at a late hour.

P. R. Bradley,
Secretary of Section.

COMMUNICATIONS

Revision of the Mining Law.

H. V. Winchell.—I am interested in the report of the discussion of the recommendations of the Mining Law Committee by the New York section contained in the Bulletin for September 30, and am gratified to notice the extent to which the views of the committee were approved.

I am a little surprised at the readiness with which the question of leasing mine property still owned by the Government was settled, and the motion of Mr. Spilsbury adopted as reported on page 254. I do not believe it will be possible to persuade Congress to retain much longer in our statutes any general provision for the patenting of mining property of all kinds. There have already been prepared several bills providing for the leasing of coal deposits, petroleum basins, etc., and I am satisfied that there is a pretty general sentiment in opposition to the patenting in fee simple of such minerals.

It is likewise difficult for me to understand how, as suggested by Mr. Rogers and approved by the New York section, "A uniform type of mineral location should be provided to cover all classes of mineral deposits, whether lode, placer or other type, location of and title to which should be subject to the same regulations."

If there is a distinction between the title given to metalliferous deposits and other kinds of minerals, the former being granted in fee simple and the latter in some other kind of possessory right, it will be practically impossible to provide for the same kind of location in all cases.

The amendment of Mr. Catlin providing for the elimination of the word "placer" in Recommendation No. 4 was really unnecessary and serves to make the recommendation less specific and definite than it was intended to be. There is already a statute which provides for the operation of the statute of limitations in the case of all mining locations except placer locations, and it is therefore particularly and solely this latter class of claims which should be included within such a statute in the revision of the laws. The enactment of the law in general terms as proposed in the emasculated Recommendation No. 4 would perhaps fail of its purpose for lack of definiteness.

These are all points which amply illustrate the necessity for careful scrutiny of any proposed amendments to the present statutes and a thorough understanding of the provisions of the present law as interpreted by the courts.

PERSONALS.

John M. Boutwell, consulting geologist for Phelps, Dodge & Co., having finished his report of the property of the Detroit Copper Mining Co., has left Santa Barbara for Globe, where he will make an examination of the property of the Old Dominion Copper Mining & Smelting Company.

Charles A. Chase, consulting engineer of the Liberty Bell Gold Mining Co., has been promoted to the position of general manager, succeeding Arthur Winslow, who vacates that position for Mr. Chase, but will remain President of the company as heretofore.

John T. Fuller has opened an office in Little Rock, Ark., for the practice of mining engineering. Mr. Fuller has been appointed consulting mining engineer to the Arkansas Bureau of Mines, Manufactures and Agriculture.

J. P. Hutchins was married to Miss Elizabeth McNear on Oct. 15 at St. James Church, London.

CHANGES IN ADDRESS

Ladd, G. E., New Mexico College of Agriculture and Mechanic Arts, State College, N. M.

Prichard, W. A., Room 210, 255 California Street, San Francisco, California.

Mining and Metallurgical Society *of* America

Vol. VI. November 29, 1913. No. 11

ANNOUNCEMENTS

Annual Meeting.—The sixth annual meeting of the Society will be held at the Engineers' Club, New York, on Tuesday, Jan. 13, 1914. The first session will be at 2 p. m. and will be for the transaction of business. At the second session the presentation of the gold medal of the Society will take place. The arrangements for this have not yet been made but will be announced as soon as possible. Members who cannot be present at the business meeting are requested to execute the proxy which accompanies this bulletin and mail it to the Secretary.

New York Section.—A meeting of the New York Section will be held at 8 p. m. on Thursday, December 18, 1913, at the Engineers' Club, preceded by a dinner (informal) at 6.30 p. m. The subject of discussion will be the one-man drill.

Annual Medal.—The Society has awarded its gold medal for 1913 to Herbert C. Hoover and Lou Henry Hoover, in recognition of their distinguished contributions to the literature of mining. The presentation will take place at the annual meeting in January.

Mining Law.—The report of the Committee on Mining Law has been before the Society for discussion for several months. A motion to submit it to the Society for formal action will probably be made at an early meeting of the council.

Election of Officers.—Members who have not yet voted for officers of the Society for 1914 are urged to do so without further delay. The ballot is to be canvassed on Jan. 13, 1914.

W. R. INGALLS,
Secretary.

COUNCIL MEETING.

A meeting of the council of the Society was held at the Engineers' Club, New York, on Tuesday, Nov. 8, at 5 p. m.

The Secretary reported that in accordance with the terms of the by-laws of the Society he issued on Oct. 14, 1913, notices to the members of the Society respecting the nomination of officers for 1913 and for councillors in the districts wherein retirements would occur. The nominations received from members of the Society were canvassed on Nov. 5, and acting in conformity with the terms of the by-laws, the Secretary prepared the following ballot for issuance to the members of the Society:

FOR PRESIDENT:

H. M. Chance
J. F. Kemp
H. V. Winchell

FOR VICE-PRESIDENT:

S. B. Christy
J. R. Finlay

FOR SECRETARY-TREASURER:

W. R. Ingalls

FOR COUNCILLOR OF DISTRICT 1-2-3:

J. Parke Channing
H. H. Knox
G. C. Stone

FOR COUNCILLOR OF DISTRICT 6:

A. H. Brooks
H. Jennings
E. W. Parker
G. O. Smith

FOR COUNCILLOR OF DISTRICT 7:

W. Kelly
W. N. Merriam
P. N. Moore

FOR COUNCILLOR OF DISTRICT 9-10:

H. F. Bain
R. E. Browne
J. B. Keating
M. L. Requa

The above ballot was issued on Nov. 13.

Upon motion, duly seconded, and unanimously carried, the actions of the Secretary in canvassing the nominations and preparing the ballot were approved.

The Secretary submitted the votes on award of the annual medal received from members of the council, this ballot having been issued on Oct. 30. The President examined and counted the votes, reporting that 15 had been received, all in proper form. The President then declared the result of this vote to be the award of the gold medal of the Society to Herbert C. Hoover and Lou Henry Hoover.

It was moved and seconded that the annual meeting of the Society be held in New York on Tuesday, Jan. 13, 1914, and that all arrangements for that meeting and the presentation of the gold medal of the Society be committed to the executive committee of the council. This motion was unanimously carried.

W. R. Ingalls,
Secretary.

MINUTES OF MEETINGS.

NEW YORK.

Meeting of October 23, 1913.

The October meeting of the New York section was held after an informal dinner at the Engineers' Club, on Thursday, Oct. 23, at 8:30 p. m. In the absence of the chairman, the vice-chairman, Prof. H. S. Munroe, presided at the meeting, with Louis D. Huntoon as secretary.

The following members were present: J. H. Allen, S. H. Ball, J. Parke Channing, E. L. Dufourcq, A. S. Dwight, E. F. Eurich, H. W. Hardinge, L. D. Huntoon, W. R. Ingalls, S. J. Jennings, H. H. Knox, T. H. Leggett, J. V. Lewis, D. A. Lyon, H. S. Munroe, R. Peele, A. H. Rogers, G. C. Stone, A. von der Ropp, W. Y. Westervelt, A. H. Wethey, H. A. J. Wilkens, A. L. Walker and as guests: F. L. Antisell, Chas. S. Bradley, W. M. Drury, Dr. Goodrich, Mr. Harrison, D. M. Liddell, A. P. Rogers, S. Rolla, W. L. Saunders, and E. Cappelen Smith.

The chairman announced that the subject for discussion would be the **Hydro-metallurgy of Copper** and that he had received the following letter, which was then read:

Lawrence Addicks. (Chrome, N. J.).—I have great faith in the future of wet methods for the extraction of copper. Most of the failures that have attended efforts to apply such methods have been due to want of appreciation of their limitations. First of all, a wet process should not be contemplated where smelting is reasonably possible. The proper field is in localities where smelting is badly handicapped by (*a*) low grade of the ore, (*b*) lack of suitable fluxes, (*c*) complex or refractory minerals.

(*a*) On low-grade ores, leaching offers possibilities on account of superior extraction. With freedom from gelatinous precipitates, an extraction of 95% even on low-grade material can readily be obtained by leaching. A low-grade sulphide ore is generally concentrated before smelting, giving an ultimate extraction of perhaps 70% while low-grade oxidized ores, which cannot be concentrated, often yield even lower recoveries by direct smelting, owing to the rich slags made.

(*b*) Smelting requires a charge to be sufficiently balanced between acids and bases to make a fluid slag with a reasonable temperature of formation. Some barren fluxes are almost always required to obtain this balance, and in some localities they become very expensive. Coke may be considered in a similar class. Leaching imposes no such requirement.

(*c*) Complex ores open another field. They generally carry a combination of copper, lead, and zinc, which gives a lead furnace chronic intestinal obstruction, and smelting direct is out of the question. On the other hand, the values contained are high and a relatively complicated chemical process can be considered. Much experimentation is now under way for the recovery of zinc from such ores, and it seems likely that wet methods will obtain a sound footing.

Wet processes, however, are often so complicated that they fall by their own weight. Smelting is, in general, much more easy on a working scale than on a small one, while wet methods, on the contrary, give beautiful results in the laboratory but fail absolutely in practice. This is generally due to the difficulties of filtration on a large scale, and a neglect of the effect of mass action when using excess of reagents in the laboratory. The cyclical use of solvents by regeneration is a very difficult matter in practice, owing to the concentration of impurities. A large waste of the leaching agent must, therefore, be expected; hence, this must be cheap—generally sulphuric acid. It is, further, not safe to figure on the producing high-conductivity copper by electrolytic precipitation from leaching liquors, although it may be done in exceptional circumstances.

Perhaps the greatest stumbling block in the way of a wet copper process is the question of silver and gold recovery. An attempt to leach out all three metals is the usual source of the complicated process. Sulphuric acid leaching, followed by cyaniding for the precious metals, particularly when the copper contents are relatively low, has always appealed to me, because we are dealing throughout with a process upon which reasonably accurate cost estimates can be made.

This predicates the ability thoroughly to neutralize the residue before the cyanide is applied, and this problem has given much trouble. I believe that the agitation tanks developed in cyanide work can be successfully adapted here, the leaching being done on material in suspension. We must also assume that the first leaching yields a residue that does not cause a disproportionate consumption of cyanide.

The following points must be kept in mind in discussing leaching in general:

1. Can the ore be reasonably smelted? If so, do not leach.

2. Are any gelatinous precipitates formed? These render leaching almost impossible.

3. Are sufficient carbonates present to make the acid consumption inordinate?

4. Allow ½ cent per lb. below wire-bar price to cover refining of the cathodes and selling as casting copper.

5. Make a large-scale test in each individual case.

W. R. Ingalls.—I have received the following letter from Mr. G. D. Van Arsdale, of Douglas, Arizona, who is experimenting in behalf of Phelps, Dodge & Co.:

G. D. Van Arsdale.—We have been experimenting on copper leaching on a fairly large scale for some time. The plan we are working on for the present has been sulphatizing roasting in a Wedge muffle furnace, followed by leaching, and electrolytic precipitation of the copper.

Our results have been very encouraging, for both the furnace and the electrolysis. As to the latter, I am precipitating copper at a power cost of less than ½ kw.-hr. per pound of copper. There does not seem any doubt that the Wedge furnace is a good apparatus for the roasting. We have so far thoroughly tested a porphyry ore and some slime tailings from one of our mills. On the first we can be quite sure of over 60% water soluble and about 90% total soluble, with tailings, after leaching, containing 0.2% Cu or elss. The mill tailings are now giving us results a little better, the insoluble running down to about 0.1% copper.

The Chairman.—Mr. Channing has inaugurated some experiments in the direction of lixiviation in Arizona, and if he is willing, we shall be very glad to hear about the promise of solving this.

J. Parke Channing.—The problem we have to solve is to treat the ore of the New Keystone mine. The New Keystone is one of the mines in the Miami-Inspiration district, and contains several million tons of so-called porphyry ore, which is extremely silicious, 80 to 85% silica, with about 2¼% copper, of which 40% is oxidized in the form of carbonate and silicate.

From the results in the Miami mill it was evident that it would be uncommercial to treat the ore of the New Keystone mine by the ordinary water concentration methods. Miami makes a saving of 80% of the chalcocite and of only about 30% of the oxidized copper. We therefore engaged Mr. R. C. Canby to work out a method for us. He has conducted experiments for several months and has now finished a small leaching plant capable of treating 10 to 15 tons a day, and is about ready to start. The preliminary work was done largely in the laboratory, and as Mr. Addicks has pointed out, laboratory work is usually more successful than on a large scale. I am very fortunate in having associated with me Mr. J. H. Susmann, who back in the early days was connected with the Hunt and Douglas process at Argentine, so we knew what difficulties we were encountering.

The process which Mr. Canby has decided upon begins with a coarse crushing, and while dry the very fine and presumably colloidal material, which makes most of the trouble, will be taken out by a centrifugal and vacuum process. This is followed by water concentration for taking out the coarse chalcocite, the problem then being what to do with the tailing from this roughing process, and whether it is desirable to treat it by flotation or not. Our neighbors, the Inspiration, have made a great many experiments with this process and have found it extremely delicate. If the solution is acid, you will not get a flotation; if alkaline, of course you will not; if sulphate of copper is present, you cannot accomplish flotation; hence, taking everything into consideration, we have concluded to roast the remaining material by a treatment similar to that which Mr. Laist is going to give his tailing at Anaconda, not sulphating, but a real dead roast. It is then to be leached with sulphuric acid, which, from the laboratory experiments, we expect to yield an excellent extraction.

The next problem is how to precipitate the copper from that solution. One can always fall back upon scrap iron, which is what Mr. Laist is doing at Anaconda, or at least, that is the method he feels sure will give results. We have concluded to follow, for the present at least, the same process that Dr. Douglas and Mr. Van Arsdale are using, that is, to precipitate the copper electrolytically, and at the same time to regenerate the electrolyte by the addition of sulphurous acid. Theoretically, if you can get the proper amount of SO_2 into the solution, your power consumption will be reduced to nothing; hence, it is our intention to attempt to regenerate the electrolyte with SO_2 which will probably reduce the current consumption to a minimum.

A number of things have developed which may be of interest. In the first place, it is evident that, with either leaching or flotation, it is desirable to take out all of the coarse chalcocite in the ore by the ordinary water method. It probably is a very desirable thing to remove the colloidal material, which largely interferes with filtration and percolation; in fact, we are inclined to think that this same colloidal material now interferes at Miami with the saving of the chalcocite in slime in the ordinary water concentration. It has also been found that in any flotation process an alkaline reaction is perfectly fatal. The ordinary product from the Hardinge mills cannot be floated. It was found that this was due to the slight alkalinity which came from the cement used to hold the silica lining together. By adding sulphuric acid to neutralize this, one can get a beautiful flotation. We are also considering the use of the Baxeres or Alexander process, the advantage of which method is that it will treat chalcocite, as well as carbonate, without the necessity of any preliminary roast. I hope that in about two or three months I can give definite figures. We are inclined to think that the method we propose to use is the most economical one for our particular ore.

In the Miami-Inspiration ores it seems almost impossible to cause flotation of the chalcocite without crushing to 100 mesh; 60 mesh will not permit any, and 80 mesh will yield but a small amount of flotation. So far as we can see, roasting and leaching promise more than flotation. Flotation will save absolutely none of the oxidized material.

Sidney J. Jennings.—What percentage of the material is colloidal?

J. Parke Channing.—Probably not to exceed 5 per cent.

W. R. Ingalls.—How do you propose to leach?

J. Parke Channing.—By straight percolation. We may possibly send our solution around a second time.

H. H. Knox.—How do you propose to treat the colloidal material?

J. Parke Channing.—That detail is not yet worked out. It will probably have to be some agitation and filtration method.

A. H. Rogers.—My contribution to the discussion this evening is somewhat in the nature of ancient history. I was engaged about 22 years ago as chemist at the first plant built to operate the Hunt and Douglas second process. I regret that I can give no more than a synopsis of this process. I have been unable to locate my notes regarding it, so must speak from memory.

Messrs. Hunt and Douglas devised two wet methods for treating copper ores. The first depended on the use of ferrous chloride as a solvent; the second, to which I am referring, used sulphuric acid as a solvent, which was regenerated by the subsequent precipitation of the copper by sulphurous acid.

The plant was located at Copper Basin, Ariz. I do not remember its nominal capacity, but it must have been in the neighborhood of 100 tons per day. The ore was a conglomerate, the cementing material of which was composed, in part, of copper carbonates. The ore was crushed to about ¼ in. and was fed gradually into a stirring tank which had already been charged with the proper amount of a solution containing 6 or 7% H_2SO4. The ore was fed in until the acid was neutralized, when the whole charge was run off into a filter tank. This was to separate the clear liquor from the ore, but the classifying action, due to settling, made it difficult to filter; hence, later, the liquor was cleared by settling.

To the clear copper sulphate solution so obtained, enough chlorine, as sodium or calcium chloride, was added to form cuprous chloride with the copper present. The liquor was then charged into a closed tank and sulphurous acid injected. As a result, cuprous chloride was precipitated, with the simultaneous regeneration of the sulphuric acid. When the precipitation was carried as far as economically possible, the charge was drawn out into hopper-shaped tanks where the cuprous chloride was allowed to settle and the clear acid liquor drawn off for use in dissolving a new batch of ore. The cuprous chloride, after washing, was converted to cuprous oxide by the addition of milk of lime, and was filtered in a filter press. The clear filtrate, containing the calcium chloride, was concentrated by evaporation and used for chloridizing a new batch of copper sulphate solution.

The sulphurous acid for precipitation was derived from roasting Congress concentrates in a Douglas furnace. This furnace was of cylindrical form, through the center of which ran a flue for heating. It was found, however, that with material so high in sulphur as the concentrates used, no extraneous heat was required, once the furnace was heated.

The reactions involved are as follows:

When the copper is dissolved from the ore:

$$2\,CuO + 2H_2SO4 = 2CuSO4 + 2H_2O.$$

When the chloride is added:

$$2CuSO4 + 2NaCl = CuCl_2 + CuSO4 + Na_2SO4$$

or, when calcium chloride is used:

$$2CuSO4 + CaCl_2 = CuCl_2 + CuSO4 + CaSO4$$

When sulphurous acid is injected:

$$CuCl_2 + CuSO_4 + SO_2 + 2H_2O = 2CuCl + 2H_2SO_4$$

and when the cuprous chloride is converted to cuprous oxide:

$$2CuCl + CaO = Cu_2O + CaCl_2.$$

From these reactions it may be seen that the only reagents added, once stock solutions are made up, are sulphurous acid and lime, both likely to be plentiful and cheap.

In practice, a number of practical difficulties occurred. It was difficult to get the copper sulphate liquor free from slimes from the ore. This difficulty was afterward overcome in the plant built at Argentine, Kan., by filtering through wooden filter presses. With us it resulted in an impure cuprous oxide, as the cuprous chloride always carried down the ore slime. It also caused the accumulation of a large amount of wash water.

When using calcium chloride as the chloridizing agent, the calcium is precipitated as sulphate. When salt is used, sodium sulphate results from the reaction, and this, being soluble, accumulates in the solution until it reaches saturation, when its crystallization causes trouble. Therefore, the precipitation of the calcium as sulphate would be an advantage, but we found great difficulty in either settling or filtering it, whether added before or after separation of the liquor from the ore. Of course, it is important that it be thoroughly separated, as otherwise it appears in the cuprous oxide to contaminate the copper with sulphur when the latter is smelted.

The precipitation of the cuprous chloride works well and can be carried to a point where the liquor contains 1%, or a little more, of copper. Before using on a new batch of ore, this liquor must be freed from any sulphurous acid remaining in it, by boiling or blowing with air. The conversion of the chloride to the sub-oxide is also rapid and satisfactory. This is quantitative and the completion of the reaction is easily determined. The sub-oxide filters well enough, but it was found impossible to wash it free from chlorine. The presence of the latter was not suspected until, on smelting it, a heavy loss of copper was found, and incrustations in the blast-furnace flue were identified as some chlorine compound of copper. At Argentine, the same difficulty was overcome by leading the furnace gases through a tower, down which milk of lime was showered. This absorbed all volatilized chlorides.

But little headway had been made at the Copper Basin plant in solving these difficulties, when the mill burned down. The process was afterwards installed at Argentine for working copper-lead mattes and was fairly successful, I believe. It was abandoned finally, as it was found more profitable to make the copper from the matte directly into bluestone.

E. A. Cappelen Smith.—As a result of experiments lasting about a year at the Braden mines, it was decided to put up a small leaching plant for the treatment of concentrates. The process decided on was roasting of the concentrates in a Wedge furnace in such a manner as to eliminate practically all of the sulphur and at the same time oxidize all the iron to the ferric state. The concentrates, after roasting, contained 2 to 3% sulphur, practically all in the form of sulphate, 15 to 18% copper, and about the same amount of iron, of which only a very small amount was present in the ferrous state. The roasted concentrates were leached with dilute sulphuric acid, the leaching operation being divided into two stages: first, neutralizing leaching; second, acid leaching. The solution from the neutralizing leaching was electrolyzed direct, whereas the solution from the acid leaching was neutralized by the following batch of calcines. Several leachings made in the plant indicate an extraction of between 90 and 95% of the copper present in the concentrates.

At the mines of the Chile Exploration Co., the process consists in crushing the brochantite ore to from ¼ to ½ in. mesh, leaching with dilute sulphuric acid in large open tanks, draining the leach solution, electrolyzing it with insoluble anodes, and returning the electrolyzed solution for further leaching. Tests show a recovery in excess of 90% of the copper contained in the ore. The capacity of the plant now building is to be 10,000 tons of ore per day. The cycle of operation, including filling of the tanks, leaching and washing of the ore, and discharging of tanks is to take approximately one week. The bronchantite ores have available sulphuric acid in the form of copper sulphate in such amount that an actual gain of sulphuric acid is obtained over and above the amount discarded with the tailings and absorbed in inert salts.

Charles S. Bradley.—Mr. Addicks' letter, just read by the Chairman, is very suggestive. One of his principal statements bearing upon the hydro-metallurgy of copper is that engineers make a mistake in assuming that the hydro-metallurgy of copper will supersede smelting, and that in his opinion the wet method should be treated as an adjunct to the smelter, and not as a process to replace the concentrator and smelter.

I disagree with Mr. Addicks in this respect, and believe that the hydro-metallurgy of copper is bound to supersede the concentrator and smelter. In the first place, mechanical and hydraulic concentration can never be complete, while chemical action can practically complete the extraction of copper from ores. The extracted materials, in the form of precipitates, when properly handled, will lend themselves to a reduction to metallic state with less expense than is possible with blast furnaces and reverberatories working on the present concentrates.

I have another objection to Mr. Addicks' position as to the matter of success. If one is to hit the bull's eye, he must aim directly at it, and if hydro-metallurgy of copper is to succeed, tentative methods will only delay it and will put the subject more in disgrace than ever before.

When I entered the field, there were 1063 United States patents that bore more or less upon the leaching of copper from its ores. You would find tanks near smelters and concentrators, showing the remains of leaching processes, all the way from Maine to California. Such efforts are more or less sporadic. The subject must be undertaken from the inventive standpoint, and capital must be available for a complete and perfected process. The rewards to be attained are enormous, as the present extraction will not average 70%. I am also satisfied from experience and careful figuring that the investment in a plant for the hydro-metallurgy of copper will be even less than for a smelter and concentrator, and that the cost per ton of ore handled will be less than it is by present methods.

Mr. Channing has spoken of colloidal dust as an obstacle to filtration. I do not know exactly what he means by colloidal dust. I have found that filtration is always easy if the chemistry is right. That is, no matter how fine the ore may be ground, filtration is always rapid when the proper chemical conditions exist in the solutions, and I find no difficulty in economic filtration. Our filters will handle 50 lbs. of ore and 100 lbs. of solutions per square foot of area per hour. This includes the time of washing and removal; hence I think, within reason, that all difficulties of filtration are surmounted, provided the right solutions are chosen. Very few experimenters have given close attention to the requirements of hydro-metallurgy of copper. An examination of the ores shows, in almost all cases, that there is sufficient sulphur, when oxidized in connection with the copper to sulphate of copper, to yield the acid radical in ample amount for the wet chemical extraction.

By proceeding in a proper manner, the copper in the ores can be brought into solution with a very small amount of imported material. The losses in my process are about 2 lbs. of calcium chloride per ton of ore handled. The calcium of this is supplied from the lime used, while the chlorine has to come from outside sources; but it is needless to say, it is very small in amount. Very few mines are not situated within reach of limestone deposits.

A study of the necessities of the case very quickly brings one to the conclusion that precipitation must be done with lime or limestone. In the first place, it is the cheapest material; secondly, the sulphur is all carried away as insoluble sulphate of calcium. This keeps the sulphur from the air and from the streams.

I wish to emphasize the importance of calcium in the extraction of copper. It is a very important link and, I believe, a necessary one. In considering the avidity of acids and the salts which are derived therefrom, we find that hydrochloric acid has an avidity of 1.00 for copper against 0.56 for sulphuric acid. I have found in almost all cases that where I could get an 83 or 84% extraction as sulphates, I could get 97 and 98% extraction with chlorides. I have also had much better success in filtering chlorides than in filtering sulphates. Now, as the copper comes into solution as sulphate, when sulphur is used to produce the acid radical, and as it is advisable to extract with chlorides, an interchange must be accomplished; and calcium chloride is the only substance to accomplish this result, because calcium sulphate is insoluble, and the chlorine passes from the calcium to the copper. As the sulphuric acid radical must be discarded as calcium sulphate, restoration of the calcium must be made to the system of extraction. Therefore, the precipitation, when made with lime, accomplishes this result.

I hope that this makes plain the varied and complete functions which calcium and chlorine perform in the extraction of copper. I believe that cases are very rare in which these observations will not apply in the hydro-metallurgy of copper.

I do not favor the electrolytic deposition of copper from the solutions because copper compounds are so easily reduced by ordinary reducing materials, the reactions being exothermic and the chemical reduction being carried on in very large masses, whereas electrolytic cells require a vast number of subdivisions. I do not believe that electrolysis is economical even if we neglect the cost of electricity. I would sooner think of producing electricity by dissolving copper and again reducing it, than of using electricity to deposit copper.

The reduction of copper from precipitates is entirely a different problem from the ordinary process of smelting. The difficulties of slags can be entirely avoided; I have found that I can reduce the copper from precipitates at low temperatures, and experience no trouble with slags nor with oxygen.

D. M. Liddell.—It is with some diffidence that I venture to speak in this meeting, since we have been listening to the men who actually do things, while I can tell only by hearsay what is being done. However, I wish to state that at least one experimenter is trying chemical precipitation, which is said by Mr. Bradley to be the correct method, instead of electrolytic, which everyone else has described.

This particular company is trying a sulphatizing roast, followed by leaching. It owns a deposit of cupriferous hematites which it has been trying to reduce to spongy iron, the idea being to use this iron to throw down copper from the leaching solutions, at the same time recovering the copper in the hematite. The laboratory experiments on the reduction of the hematite by carbon monoxide worked beautifully. Then the same process was tried in a cement kiln, and the melancholy result followed, which was declared impossible by Mr. Bradley: what worked in the laboratory didn't work in practice. I understand, however, that working with a mixture of hematite and crushed coal or other solid carbonaceous material, and subjecting this to reduction by carbon monoxide, excellent results are being secured. It is an interesting example, like Chuquicamata, of the general problem's being dominated by a local condition.

J. Parke Channing.—I would like to call attention to the fact that Mr. Westervelt has some figures in relation to his experiments at Ray. He has some definite figures on power and acid consumption. I think it would be very enlightening if we heard from Mr. Westervelt.

W. Y. Westervelt.—The figures to which Mr. Channing refers are those secured from a test run in an experimental electrolytic leaching plant which I installed some years ago on the Ray property, Pinal County, Ariz. I had erected a little plant capable of containing about 1,000 lb. of the typical "porphyry" chalcocite ore of the property, in which I was able to carry on a complete cycle of operations from rough jigged ore to leached tailings and copper cathodes. After experimenting with this plant for some time to determine the proper composition of solutions, density of current, and various other details, I started a continuous test run which was maintained 24 hours a day for 33 consecutive days. The active elements in the solutions were the sulphates of iron and free sulphuric acid. The determinations made during this test run were as follows:

Ore.—That in the vats at the beginning of the tests was carefully sampled and assayed by the vat. That added during the test was weighed, sampled, and assayed by the vat charge of 200 lb. each. Tailings rejected during the test were sampled, and assayed by the vat discharged. The ore remaining in the vats at the end of the test was sampled and assayed by the vat.

Solutions.—At the beginning of the tests the solutions in the vats were carefully drawn off, measured and sampled. The same was done independently with that in the electrolytic tank; and again independently with that in the storage tanks.

All acid added (commercial 66° B. sulphuric acid) was carefully weighed as added. Additions of water were measured, the condition of the solution was daily determined by assay, and on completion of the test, complete measurement and assay was again resorted to.

Copper Produced.—The electrolytic copper was deposited on copper cathodes previously made from the Ray ore by stripping the deposition on rolled copper sheets. These cathodes were removed and weighed daily.

Electric Energy.—The voltage maintained at the tank was determined hourly by a Weston voltmeter capable of being read to 0.01 volt. The amperes were determined both by hourly readings of a Weston ammeter and by checking against the daily weighings of a standard copper voltmeter.

Heat.—The heating was done solely in the leaching vats by means of closed lead-pipe coils placed in the bottoms. Steam was supplied to these coils from a main line running over the five vats and the condensed water was all secured by connecting the ends of the coils with the main drain pipe, the latter itself discharging into a measuring can. The steam supply was regulated by a valve to each coil, as was also the discharge into the drain pipe, by another valve. The drain pipe itself, in which the condensed water accumulated, was kept closed by a valve so that no uncondensed steam could escape.

The ratio of volume to surface of the vats employed was 3.03, while that of 26-ft., 100-ton vats is 0.487, or less than 1/6. In other words, the heat radiating and conveying surface of the experimental plant was over six times as great proportionately as would be that of a 100-ton vat plant. Again, the evaporative surface of an operating plant would not be 1/4 as great proportionately as that of the experimental plant, while a considerable part of the steam condensing surface in the experimental plant was outside the vats, thus doing no work, while registering as condensed steam. Due allowance was accordingly made for these factors in calculating results.

The results secured are summarized in the following:

Copper deposited, total run	40.28	lb.
Copper deposited, per diem	1.22	“
Amount ore in vats	1000.00	“
Copper deposited per diem, per ton in vats (0.122%)	2.44	“
Days required to extract 40 lb. per ton	16.4	days
Acid consumed	91.4	lb.
Acid consumed per lb. copper deposited	2.27	“
Ampere-hours consumed	22.382	
Ampere-voltage	1.7	
Kilowatt-hours	38.0494	
Kilowatt-hour per lb. copper	0.945	
Ampere-hours consumed per lb. copper	556.	
Steam condensed per lb. copper deposited	33.0	lb.
Extraction	80%	
Average temperature of vats	72°C	
Assay of tailings	0.3%	

A. L. Walker.—I move a vote of thanks to our guests who have entertained us with papers and remarks. [Motion carried.]

The meeting adjourned at 10:30 p. m.

L. D. HUNTOON,
Secretary of Section.

COMMITTEE ON STANDARDIZATION

The following communication from Hennen Jennings, member of the committee on standardization, is here published, by order of the Council, as an addition to the minutes on definitions:

Hennen Jennings.—It seems to me that we have not as yet been able to suggest any great improvement on the standards and definitions established by the Institution of Mining and Metallurgy. Professor Peele's most exhaustive researches as to the current definitions on the subject of "Ore in Sight" demonstrate the impossibility of meeting the situation by any entirely satisfactory definition. This further convinces me of the desirability of continued adherence to the recommendations of the Institution of Mining and Metallurgy, which are:

1. That members of the Institution should not make use of the term "ore in sight," in their reports, without indicating, in the most explicit manner, the data upon which the estimate is based; and that it is most desirable that estimates should be illustrated by drawings.

2. That as the term "ore in sight" is frequently used to indicate two separate factors in an estimate, namely:

(*a*) Ore blocked out; that is, ore exposed on at least three sides within reasonable distance of each other;

(*b*) Ore which may be reasonably assumed to exist though not actually "blocked out;"

these two factors should in all cases be kept distinct, as (*a*) is governed by fixed rules, whilst (*b*) is dependent upon individual judgment and local experience.

3. That in making use of the term "ore in sight" an engineer should demonstrate that the ore so denominated is capable of being profitably extracted under the working conditions obtaining in the district.

4. That the members of the Institution be urged to protect the best interests of the profession by using their influence in every way possible to prevent and discourage the use of the term "ore in sight" except as defined above; and the council also strongly advises that no ambiguity or mystery in this connection should be tolerated, as it considers that such ambiguity is an indication of dishonesty or incompetence.

This appeals to the whole profession, not so much for precision of definition as from the demand that all engineers should supply full and honest details when dealing with the subject of ore reserves.

Regarding the standard ton, the Institution of Mining and Metallurgy advises:

The word "ton" shall represent a weight of 2,000 lb. avoirdupois (29,166.6 oz. troy).

In my opinion, it is advisable to abandon the use of the terms "hundredweight" and "quarter," and to express fractions of a ton in pounds or in decimals of a ton. Of course, this does not meet all cases, but would it not be well to uphold this definition also, and to recommend that when any other ton is adopted, its weight should be specified?

I suggest the following:

An ore is a mineral or mineral aggregate, containing metals or metalloids, which, when occurring in sufficient quantity and under suitable conditions, can be treated with commercial profit.

"Ore in Sight."—I entirely concur in the proposal that the term "ore in sight" be abandoned. When this is done, however, it will be all the more incumbent on us to use care not to replace it by another term which may be almost equally subject to misconception.

Such a term I believe "positive ore" to be. The quantity and value of ore in the ground are never absolutely proved; it is a case merely of varying degrees of evidence. Even if an arbitrary limit for dimensions of blocks be adopted, there is always grave uncertainty, in the case of many deposits, as to tonnage and value. The term conveys an idea of illogical or rather misleading precision, such as, in another part of the report, is deprecated.

As to "possible ore," I agree with T. A. Rickard and Krusch in saying that in no circumstances are we justified in making definite statements in figures under such a heading; and that by permitting the use of the term at all, in connection with figures of tonnage, we are providing an opportunity for unscrupulous men to misrepresent facts under the guise of precision. And who can say what is *not* possible? We may consider the faker's estimates most highly improbable, but we can never contradict him positively.

I submit that the utmost that can be wisely permitted in respect of classification is somewhat as follows:

(1) "Ore completely blocked out" is ore which is exposed and sampled on four sides, in blocks of reasonable dimensions, the size permissible for which would vary inversely with the thickness and the degree of uniformity of the deposit, in value and otherwise.

Any formal endorsement by the Society of this term should be coupled with a warning that, whilst complete blocking out of ore is frequently desirable for the sake of assuring tangible assets, nevertheless, economy in mining should not be neglected for the sake of facilitating such stock-taking; and that, in many cases, it would be bad mining to perform unnecessary development work for the sole purpose of blocking out ore on four sides.

(2) "Ore partially blocked out" is ore exposed on more than one and less than four sides; an estimate of which may be sub-divided into classes, according to the number of sides on which the orebody is exposed, and the degree of confidence with which the engineer is led, by other evidence, to repose in the estimate.

As pointed out by G. M. Gouyard and J. H. Curle, some evidence of proved ore is afforded by an exposure on a single side. It is very rare, however, for the quantity which any safe rule would permit under this heading to be considerable, and the dangers which may result from the misuse of such an estimate outweigh any convenience in providing for it. In any event, the engineer should express his judgment as to the prospective life of the mine; and existing ore-faces form a very important part of the evidence on which such a judgment should be based.

Let me here quote from an address which I made in January, 1909, to the graduating class of the School of Mines at Golden:

> It is the fashion now to use terms such as "ore blocked out," "probable ore," "possible ore," etc., and some engineers have attempted once more to stereotype these useful relative conceptions by attaching fixed rules to their use. It has been suggested, for instance, that "positive ore," or "ore blocked out" shall always mean ore exposed on three or more sides; "probable ore," ore exposed on two sides, and "possible ore," ore exposed on one side only, regardless of the obvious fact that the value of any exposure depends on the distance between the openings.

What is still more conclusive against the attempt to limit the use of these terms is the fact that the relative value of each exposure varies even more with the character of the ore deposit under consideration. No such hard and fast meanings were ever intended to be attached to these terms by their originators, my brother, the late Arthur L. Collins, and Arthur Winslow. They clearly recognized that the use of each term was a matter for the discretion of the engineer making use of it. . . . . I think myself that "ore resrves" and "ore blocked out" should merely describe ore which is ready for stoping, by whatever method is usually or properly adopted under the conditions. For instance, in certain districts, where it is often cheaper to carry a raise together with an overhand stope than to make the raise first and stope from it, ore may be "blocked out" (as far as it ever will be) when exposed only in two successive levels. But no conservative engineer would be willing, in such a case, to call it "positive ore," nor to give it any large credit as to tonnage.

The only safe plan is that which the Institution of Mining and Metallurgy requires its membership to follow, viz.: to state definitely, or illustrate with plans, the exact nature of the exposures, or evidence on which the engineer relies in making his estimates of tonnage of available ore.

COMMUNICATIONS

Committee on Standardization.

George E. Collins.—In the absence of a local section of the Society in Denver, I venture to send for transmittal to the Society's committee on standardization the following criticisms of Professor Peele's report published in Bulletin 64.

Definition of "Ore."—I observe that Professor Peele favors a definition based not merely on the contents of the substance to be classed as "ore," but also on the quantity in which the substance occurs.

Personally, and at first sight, von Cotta's definition makes a decided appeal to my common-sense. "Ore is any metal-bearing substance for which the prospector seeks, or which the miner works." I, however, admit the force of Kemp's contention that the test as to whether the substance is capable of yielding metal at a profit is the only final and positive way in which to decide whether it is ore or not ore; but this test must not depend on the local conditions under which any individual piece of the substance happens to occur. If the substance is identical with that which is somewhere being profitably handled, it is the same kind of substance, and both are equally entitled to be named "ore." The quantity of the substance which is, or may be, found in any particular case does not affect its nature and ought not to affect the name by which it is described.

Furthermore, the test of susceptibility to profitable extraction cannot be applied to each individual occurrence of the substance "ore," because usually there is no practicable way of finding out whether, in each case, it can be profitably worked. Those of us whose business it is to judge, by the most elaborate and painstaking study, whether an orebody is potentially profitable or not, should surely hesitate to accept a definition which would compel us to halt and apply this laborious and expensive study every time we have to decide whether to call a mass of mineral "ore" or "waste."

I cannot believe it conducive to clearness of thought, nor to general acceptance among people, if material is "ore" when it occurs at my mine, but not ore when precisely the same material occurs at my neighbor's mine only two miles away, but on the farther side of the range; nor again, if it is "ore" when it occurs in one mine, and not ore when the same miner finds it in the breast of a drift in another mine, but does not yet know whether it occurs "in such quantity. . . . . as to make extraction commercially profitable"; nor again, if a material which was not ore where it originally lay, say, on the coast of Africa, becomes ore merely because a steamer happened to load it as ballast, and discharge it near a smelting centre; nor yet again, if material is not ore when each of a score of miners breaks and raises to surface a small pile of it, but becomes ore directly they club together and make a carload shipment.

PERSONALS.

Corey C. Brayton has returned from Nome, Alaska, to San Francisco. He was engaged during the summer in gold dredging in the Solomon district.

J. V. N. Dorr will spend a great deal of his time in New York this winter attending to the business of the Dorr Cyanide Machinery Co., which has opened an office at 50 Church St.

Howard W. DuBois was in Victoria last month, after having spent some time investigating mineral resources in the eastern part of the Caribou district of British Columbia, and thence over the Rocky Mountains in Alberta.

Stanly A. Easton is one of the members of a commission appointed by the Governor of Idaho to draft a workmen's compensation act for that State.

Robert C. Gemmell, manager of the Utah Copper Company, and his wife, were made the recipients of a handsome punch bowl set from the operating heads of the company, on the occasion of their twenty-fifth wedding anniversary.

H. W. Hardinge is at present on an extended tour through the Northwest, including British Columbia, to inspect recent large installations of Hardinge mills in that district.

George A. Packard intends to make his Boston office, 50 Congress St., his headquarters instead of Butte, Mont., as in the recent past.

George S. Rice delivered a lecture, illustrated with moving pictures and lantern slides, on "Mine Safety Investigation of the U. S. Bureau of Mines," before the Alumni Association of Columbia University, Nov. 7, at the University Club, Pittsburgh.

Orvil R. Whitaker will be consulting engineer for the Canadian Agency, Ltd., a new company, which has recently purchased the Bonanza and other mines in Nicaragua.

MEMBERS ELECTED IN NOVEMBER, 1913.

Addicks, Lawrence ....Chrome, N. J.
Supt. U. S. Metals Refining Co.

Barbour, Percy E..............................Candor, N. C.
Gen. Mgr. Uwarra Mining Co.

Gormley, Samuel J............................Hayden, Ariz.
Consulting Metallurgist.

Williams, Ralph B. ....96 High St., Newburyport, Mass.
Mining Engineer.

CHANGES IN ADDRESS.

Darton, N. H. ......c-o U. S. Geol. Survey, Washington, D. C.

Hixon, H. W. ....c-o The Covington, Philadelphia, Pa.

Packard, George A. ....50 Congress St., Boston, Mass.

Wethey, A. H. ....37 Madison Ave., New York

Mining and Metallurgical Society *of* America

Vol. VI. December 31, 1913. No. 12

ANNOUNCEMENTS

Annual Meeting.—The sixth annual meeting of the Society will be held at the Engineers' Club, 32 West 40th St., New York, on Tuesday, Jan. 13, 1914. The first session will be at 2 p. m. and the second at 8:30 p. m. The annual dinner of the Society will be held in the Engineers' Club at 6:30 p. m. This will be informal.

Members who are intending to be present at the annual dinner are requested to promptly notify W. R. Ingalls, 505 Pearl St., New York.

New York Section.—The January meeting of the New York Section will coincide with the annual meeting of the Society.

Tellers.—The President of the Society has appointed F. W. Parsons and E. G. Spilsbury tellers to count the vote for officers at the annual meeting, Jan. 13, 1914.

Philadelphia Section.—A meeting of the Philadelphia Section was held at the Union League Club, Philadelphia, on Monday, December 5, preceded by a dinner. The minutes have not yet been received by the Secretary.

Attendance at Meetings.—Numerous communications are received from members of the Society inquiring if they be permitted to attend some meeting of some local section with which they are not affiliated. Every member of the Society has the right to attend every meeting of every section and in view of such right no invitation is necessary. It is the custom of some of the local sections to meet at dinner in advance of the session at which the reading of papers and discussion of them take place. The dinner is considered to be part of the meeting and the right of attendance possessed by every member extends of course to the dinner. Local sections attend to their own finances, which, however, pertain only to the professional and technical part of the meetings. The expenses of the dinners are borne only by those who participate. A member not enrolled in a local section who attends a dinner receives a bill from the secretary of the section, just as do the members of the section. Inasmuch as the proper arrangement of dinner-meetings involves some knowledge of the probable attendance, it is only courtesy that members intending to be present should notify the chairman of the section. Such notification may be made, however, as late as half an hour preceding the dinner, although of course the earlier notice can be given, the better it is. Owing to the evident misunderstanding respecting some of these points, it has seemed to be worth while to publish this note.

W. R. Ingalls,
Secretary.

MEETING OF COUNCIL

A meeting of the council was held at the Engineers' Club, New York, on December 18, at 5:15 p. m. The members present were Messrs. Chance, Finlay, Munroe, Ingalls, Kemp and Penrose. Mr. Garrison was represented by proxy. Dr. Chance presided.

The executive committee reported its consideration of the matter of presenting the annual medal of the Society.

Upon motion, duly seconded, and unanimously carried, it was voted that the Society have a dinner for the presentation of the medal of 1914, that the date of the dinner be fixed at the convenience of Mr. and Mrs. Hoover, and that a committee be appointed by the President to make the arrangements for the dinner.

Professor Munroe reported in behalf of the medal committee that the wax molds for the medal are nearly completed, that they have been examined by the committee and that it is expected that the medal will be cast in January, 1914.

J. Parke Channing, chairman of the committee on welfare, reported (by letter) as follows:

> I beg to advise that the first meeting of the committee on welfare of mine and metallurgical employees was held on December 12 at the Lawyers' Club, there being present Messrs. Channing, Catlin and Westervelt. The general prospective work of the committee was discussed and suggestions made toward a division of preliminary investigation of the subject. Probably within a month another meeting of the committee will be held and at that time a definite plan of work decided upon. It may be reported to the council that the committee has organized and is making progress.

The Secretary called attention to the status of the report of the committee on mining law and the resolutions of the New York Section upon that matter.

Upon motion, duly seconded, and unanimously carried, the resolutions of the New York Section, adopted September 16, were rejected for the reasons given by Mr. H. V. Winchell in his communication published in the Society's bulletin No. 65, p. 286.

W. R. INGALLS,
Secretary.

MINUTES OF MEETINGS.

NEW YORK.

Meeting of November 18, 1913.

The November meeting of the New York section was held after an informal dinner at the Engineers' Club, on Tuesday, Nov. 18, at 8:15 p.m. The meeting was called to order by the chairman, Mr. Spilsbury. The members present were: H. M. Chance, R. M. Catlin, J. Parke Channing, E. L. Dufourcq, E. F. Eurich, J. H. Allen, F. L. Garrison, L. D. Huntoon, W. R. Ingalls, H. H. Knox, T. H. Leggett, H. S. Munroe, R. Peele, W. A. Pomeroy, T. T. Read, G. C. Stone, O. Sussman, E. G. Spilsbury, F. F. Sharpless, H. V. Winchell, H. A. J. Wilkins, and as guests, Messrs. Hardy, Robert Linton, A. P. Watt and G. M. Colvocoresses.

The Chairman.—Before we take up the subject we are to consider to-night, namely, the flotation method of concentration, I am sure we would like to hear from our President, Dr. Chance, in regard to the award of the Society's medal, which has now been decided.

H. M. Chance.—When the awarding of a medal by the Society was originally determined upon, many of our members, and perhaps some of our officers, anticipated that difficulties might arise in selecting the recipient of the award. In this first year of the award, we have been very fortunate, for when an invitation was sent out to the members asking them individually to make suggestions to the council, a very large number of those who replied (and replies came from a considerable percentage of our whole membership, all acting independently and without consultation), were found to have suggested the same individual. In this case, therefore, the Society and the council had no difficulty in reaching a decision.

After taking into consideration the suggestions made by members, the committee, in accordance with the resolution governing the procedure, nominated two candidates and submitted these two candidates to the council for letter ballot. That letter ballot was counted at the meeting of the council this afternoon, when it was found that the award is to be made to H. C. Hoover and his wife. We believe this award will unanimously be approved by our members as a fitting tribute to the service performed by Mr. Hoover and his wife in translating into English the great work of Agricola. The medal will be formally awarded at the annual meeting.

Flotation Processes of Ore Concentration.

The Chairman.—I am very sorry to have to announce that the gentlemen whom we had depended upon to discuss this subject are out of town; we shall therefore have to discuss flotation methods in a more general way, probably, than if Mr. Aldridge and some others were present. Mr. Channing, can you give us some information?

J. Parke Channing.—I have no practical experience in flotation, but have read up the literature and have seen what other people are doing; hence, I can give some ideas as to the present status of the flotation process.

The father of flotation, or rather I should say, the mother, is an American woman, Miss Carrie J. Everson, of Colorado. Miss Everson's brother, an assayer in Denver, received a shipment of concentrates in canvas sacks. These sacks, after emptying, were rather dirty, as they had been lying around for some time and were covered with oil. He therefore, handed them to his sister to be cleaned. A woman's idea of cleaning is to use soap and water; she turned them inside out, put them in a tub, and proceeded to do the washing. In so doing, she discovered that the sulphides floated to the top and that the siliceous gangue sank to the bottom. As Hoover says in his book, she had the usual keenness of a Yankee school teacher, and knew that she had made a discovery. I believe she afterwards made some experiments in which acid was used, and realizing the advantage of both acid and oil, in 1885, she was granted patent No. 348,157, covering flotation of metallic sulphides by the use of oil and water.

Flotation processes as they exist now, may be roughly divided into two classes, exemplified by the Elmore process and the Minerals Separation process. The Elmore process, invented by the Elmore brothers, is based on the fact that all water at ordinary temperature and pressure contains air in solution. The ore is mixed with a certain amount of oil. From the top of a covered chamber containing this mixture the air is exhausted so as to give a partial vacuum. Part of the air being thus released from solution in the water, combines with the oil and the metallic sulphides, and the froth of air, oil, and sulphides floats and is skimmed off. This process is now being used in one or two places.

The Minerals Separation process is based on the experiments and patents of a dozen individuals. In short, the Minerals Separation process consists, as an example, in putting a ton of ore into water, and mixing it with about 2 lb. of oil and from 1 to 10 lb. of sulphuric acid. The mixture is then heated and passed into a mixing machine, where it is beaten up and a froth is formed. This froth, which consists of oil, ore, and air, rises to the surface and is skimmed off.

Two other flotation processes have been in use. One is called the Potter-Delprat, and the other the de Bavay. The Potter-Delprat is one in which oil is not used; it relies upon the principle that if carbon dioxide be generated in a mixture it will attach itself to the particles of sulphide and cause them to rise to the surface. It is best adapted to an ore containing calcite, since by the simple addition of either sulphuric acid or salt-cake the carbonic acid is disengaged and the flotation effect produced. I understand that this is used in Western Australia.

The de Bavay process was based on the idea of surface tension, the same principle that causes a slightly greased needle to float upon the surface of water when gently laid upon it. This same principle is followed by Macquisten in his tube process.

The present state of the art resolves itself into two processes, the Elmore and the Minerals Separation. The latter process is being used in Western Australia and the company is now trying to introduce it into the United States. One copper mine, the Inspiration, has made a contract with the company. The Butte & Superior has refused to enter into a contract, and it is a debatable question, in view of the Everson patent, whether the Minerals Separation company can maintain its patents in the United States. To my mind, the main advantage enjoyed by this company is the large amount of experience it has collected in regard to the various oils and other materials used in the process of frothing.

Unfortunately, the Minerals Separation company has firmly rooted ideas as to the exact manner in which the process shall be applied, which ideas have met with very little favor among American engineers. What the company would like to do is to take your ore, experiment with it, and if it concludes that the ore can be treated, it will build your mill and treat the ore. Now few engineers feel like leaving the erection of a mill treating 3,000 to 10,000 tons a day to the mercy of English engineers who are used to handling small tonnages. As a result, the company has not been able to induce American mines to coöperate with it.

A second drawback is that the company desires to treat the whole of a given ore by flotation. The process gives a very high recovery of rich mineral, but in such physical condition that it is not easily amenable to the smelting operations which have to follow. This is the method it proposed to the Caucasus Copper Co., of Russia. There, by the present water concentration, they get a 70% extraction; by flotation experiments they got 95%. The Minerals Separation company would agree to permit the copper company to use the process only if applied to the entire ore. The copper company wisely refused to do this, realizing that it would be impossible to treat such fine concentrate in McDougall roasters and reverberatory furnaces.

The Inspiration mine, I understand, agrees to pay a certain royalty based upon the tons of material actually treated by the process. The construction of the mill is left entirely to the engineers of the Inspiration, and in their case the treatment is to be preceded by water concentration. After a portion of the chalcocite is extracted the remainder is treated by flotation. At Miami we have as yet made no experiments with the flotation process, and I do not know exactly how it will work out on our ore. Any flotation system works better on ores containing pyrite or chalcopyrite than on ores containing chalcocite. At the Inspiration, however, when the middlings were crushed to 100-mesh, they made a very satisfactory saving on the chalcocite.

The Butte & Superior, which is the only flotation plant of any size in this country, is treating at least 1000 tons of ore a day. It is primarily water concentration, a very large proportion of the zinc blende being recovered in that way. The tailings from the water concentration are ground very fine and are then treated by the flotation process. I was told the other day by a member of the board of directors of the Butte & Superior that they had steadfastly refused to make any agreement, or come to any understanding, with the Minerals Separation company. The first verdict in the case went against the Butte & Superior, but they have a strong belief that on appeal the case will be decided in their favor.

I am not trying to deprecate the excellent work done by the Minerals Separation company, but I am of the opinion that its patents are somewhat involved, that it is asking too high royalties, and that it is also making the conditions under which the process is permitted to be used altogether too onerous.

H. A. J. Wilkins.—We installed and operated an Elmore vacuum process plant at Canyon City, Colo., about 10 years ago, in connection with an experimental plant operated by the Empire Zinc Co. During my connection with this work, up to 1908, a large number of tests were made on various complex ores, the results of which were not sufficiently encouraging to warrant operating this process on a large scale. When the plant was first installed, and so long as one of the Elmore experts was on the ground, who was thoroughly conversant with the process, we found that some of the results obtained were fairly good. Later on, in other hands, the results were indifferent.

My general opinion is that the various flotation processes need careful attention and that tests and experimental runs made by experts, and under their immediate supervision, are rarely borne out in practice under the average supervision and with the usual labor that is employed. At the Braden copper mines, for instance, very high recovery was obtained when the expert of the Minerals Separation company was on the ground; but it fell to a much lower percentage when he left, and continuous commercial operatons were carried on.

E. G. Spilsbury.—Is it a fact that only vegetable oils can be used for this purpose, and that mineral oils do not give the necessary viscosity to float the ore?

J. Parke Channing.—I do not think that is the case. At the Inspiration, one of the oils used was the ordinary type of Arctic engine oil. There are certain ores with which one kind of mineral oil will work; with other ores vegetable oils will work; there are some with which creosote is used, and others with pine tar.

E. G. Spilsbury.—Has anything been done to test whether a separation between zinc blende and iron pyrites or chalcopyrite can be effected by this method, or are all sulphides attracted similarly?

J. Parke Channing.—I believe that all bright sulphides are attracted similarly.

L. D. Huntoon.—I have seen articles in which claims have been made that there is a selective action.

J. Parke Channing.—Bearing on Mr. Wilkins' contention, the Inspiration mine, after having made tests in a small way, is now putting in an experimental plant capable of treating 600 tons a day. This plant is very nearly finished and was to be started the first of December. They found in a small plant, treating two or three tons a day, that the character of the ore might change from day to day, varying sometimes from an acid to an alkaline condition, all of which had great bearing on the results obtained.

E. G. Spilsbury.—Is a very close sizing required previous to flotation?

J. Parke Channing.—Not so. The ore is simply crushed down to a certain size, usually 60-mesh at least. The Inspiration ore at 60-mesh gives no flotation, at 80-mesh, some flotation, and at 100-mesh, good flotation.

G. M. Colvocoresses.—I have had some occasion to look into the question of flotation, but I cannot add much to the historical data which Mr. Channing has already given.

In 1906 I was connected with the operation of the first Elmore plant in Canada, at the Massey copper mine in Ontario, which was before the "vacuum" improvements had been made. Prior to the installation of the Elmore, a great deal of trouble had been experienced concentrating the ore by gravity. The gangue contained much magnesia and alumina, and the copper itself was in a very finely divided, flaky state, and slimed badly. The best they could do was to recover 60% by gravity. In operating the Elmore plant we used crude petroleum oil, and eventually got a recovery of 85%. The concentrate contained 15% to 18% copper, representing a ratio of concentration of about 6 to 1. We found it necessary to grind the ore very fine, first crushing to 40-mesh, then to 60, and finally practically all of our tube-mill product was made to pass 80-mesh.

From a metallurgical point of view, the Elmore process operated very well, but unfortunately there was a heavy loss of oil with the tailings; this was a defect which we were unable to remedy, although one of the men Mr. Elmore had trained was operating the plant. This loss of oil, coupled with the high cost of fine grinding, made the process too expensive to be successful from a commercial point of view, and after a few months' run it was discontinued. I am inclined to think that the improvements which have since been introduced in this process would make it successful on the same ore that we were treating at that time.

Recently I have been investigating another flotation process on behalf of a copper mining company in Arizona, with the result that a 250-ton plant was ordered for this company. The royalty is based, in this case, on the material recovered in the concentrates.

We have at present a gravity mill equipped with jigs, tables and vanners. Our plant is to continue to make jig and table products, to combine table tails with the fine material from classifiers, to reclassify and crush all coarse material in a Hardinge mill to pass 60-mesh, and to treat the resultant pulp by flotation. We have found two or three points which require special attention. First, is the necessity of thickening the feed for the flotation plant, as this should not contain more than two or two and a half parts of water to one part of solid; for this purpose we are installing Dorr thickeners. We do not know as yet exactly to what degree of fineness it will be necessary to crush the material, but experiments seem to show that most of the mineral is liberated from the gangue at 40-mesh and practically all at 60-mesh. We also anticipate some trouble in dewatering the concentrate from the flotation plant before sending this to the roaster; further, in roasting a very fine concentrate, losses in flue-dust will be larger than with coarser material.

As regards the recovery, I may say that, in this case, gravity methods will not recover more than 65 to 70% of the valuable mineral where a clean concentrate is made. Some tests from the flotation plant have given the following results:

Mill feed	4.2% copper
Recovery	93%
Ratio of concentration	2½ into 1

Concentrates contain 20% silica.

Feed (table tails)	1.4% copper
Recovery	83%
Ratio of concentration	3.5 into 1

Concentrates contain 40% silica.

Feed (present vanner feed)	3.8% copper
Recovery	96%
Ratio of concentration	1.8 into 1

Concentrates contain 40% silica.

These tests were made on comparatively small quantities of material, and under conditions which tended to favor a high recovery of values rather than clean concentrates. In practice, we shall undoubtedly reduce the percentage of silica in the concentrate and increase the ratio of concentration. Also, we do not expect to make better than 85 to 90% recovery on the material treated. If we are able to make 93 or 94% so much the better.

We do not yet know exactly what kind of oil will be used, nor do we know the amount of oil nor the exact amount of acid required. The flotation company will experiment with the different kinds after our plant is operating, and will determine the oil and acid best suited to our ore. We have been given to understand that the cost of the oil and acid will be from 10 to 20c. per ton of material treated.

Summing up, it would appear that the various flotation processes have an important and probably a large field in concentration. Flotation plants are being operated successfully in Australia, and North and South America, and as the process becomes more perfect mechanically, the metallurgical application will doubtless be enlarged. In some cases it has proved to be the best method of treating crude ore, and often where this is not the case it seems to have proved a valuable supplement to gravity concentration, accomplishing the recovery of very fine mineral better than slimers, vanners, buddles, or tilting tables.

With your permission, I should like, at this point, to introduce a communication I have received from Mr. F. Danvers Power, relating to the operation of the Minerals Separation process at the Chesney mine of the Great Cobar, Ltd., New South Wales.

F. Danvers Power.—The Minerals Separation flotation machine is made in five sizes, as indicated by the diameter of the stirrers, with approximately the following capacities per 24 hours:

12 in. stirrer 70 to 84 tons.
15 in. stirrer 140 to 168 tons.
18 in. stirrer 200 to 240 tons.
21 in. stirrer 360 to 430 tons.
24 in. stirrer 500 to 600 tons.

At the Chesney mine of the Great Cobar, Ltd., N. S. W., we had a six-compartment, 24-in. machine. The ore, after suitable crushing, was passed over a Hancock roughing jig to save what we could by that means. The tailings were further reduced in quick working Chilean mills of the Garfield type, to pass through a 40-mesh screen. The ore treated was chalcopyrite in a hard slate and, as sent to the mill, carried 2 to 2.5% copper. On the jigs we concentrated 10.7 to 1 and in the Minerals Separation plant 16.4 to 1. The latter ratio of concentration can be regulated to any desired point according to the nature of the ore; i.e., if freight or fluxes are expensive you can obtain a higher grade of concentrate, but then the tailings are liable to become richer; hence, the best practice in any place is governed by a consideration of dollars and cents. As an example of our concentrates:

	Au.	Ag.	Cu.	Fe.	Insoluble.	AL_2O_3
Jig concentrates ...	0.2 oz.	1.0 oz.	8.9 %	24.6%	38.5%	3.4%
Minerals Separation concentrates	0.25	1.4	19.25	23.1	27.8	2.5

When feed was regular and everything was going well, our Minerals Separation concentrate would go from 17 to 25% copper and the tails 0.2%, but allowing for irregularities, 0.25% copper would be a fairer average for ordinary work.

The jig tailings fed to the Minerals Separation process assayed generally 1.3 to 1.6% copper. The weights of feed and products per cubic foot were as follows:

Jig tailings..........	105 lb.
Concentrates	167 lb.
Minerals Separation concentrates	170 lb.
Minerals Separation tailings..........	103 lb.

To get an idea of where the losses in the Minerals Separation tailings occurred, a sizing test was run on the residue with the following results:

Size.	Weight.	Copper Assay.
Above 40 mesh	5.4 %	0.44%
40- 60 mesh	13.3 %	0.44%
60- 80 mesh	14.95%	0.33%
80-100 mesh	22.0 %	0.05%
100-160 mesh	4.6 %	0.05%
160-200 mesh	13.75%	0.05%
Under 200 mesh	24.85%	0.32%

Samples were drawn simultaneously from the material in each stirrer-box of the Minerals Separation machine, and of the float passing off on the other side. The results were:

Box No.	Flotation Product Assay.		Proportion of total extraction.	Cu. contents of material in each stirrer-box.
	Cu.	Insol.		
1.	28.07%	23.6%	34.5%	1.68%
2.	25.36%	14.2%	29.1%	0.88%
3.	22.11%	25.8%	14.3%	0.66%
4.	19.89%	7.7%	7.7%	0.44%
5.	17.12%	35.7%	7.7%	0.44%
6.	11.05%	46.0%	6.4%	0.33%

The stirrers rotated at 282 r. p. m.

Although these figures give only a rough idea, it must be remembered that they are of a single experiment only, and not of a series, and that the running of the jig section, preceding the Minerals Separation machine, was not so satisfactory as I would have liked; that is why a series of tests was not then undertaken, as we were waiting for certain alterations.

To show how the valuable minerals were distributed, the following test was made of the material fed to the Minerals Separation machine, which in this case, assayed 1.85% copper:

Size.	Weight.	Copper Assay.
Above 40 mesh	2.9%	0.87%
40- 60 mesh	4.5%	.73%
60- 80 mesh	5.8%	.65%
80-100 mesh	15.9%	1.09%
100-160 mesh	5.8%	1.3 %
160-200 mesh	5.2%	2.39%
Under 200 mesh	58.4%	2.28%

It is not desirable to slime the ore, but to granulate it so as to pass through a 40-mesh sieve.

We used 0.5 lb. eucalyptus oil per ton of ore. The best oil, and also the cheapest, is that containing less eucalyptol and more phelandrine, both these principles existing in so-called eucalyptus oil. Laboratory experiments go to show that the elimination of copper by flotation with eucalyptus oil does not interfere in the slightest with subsequent cyanidation of the tailings from a flotation plant. The oil mentioned costs from 14 to 18c. per lb. in Sydney. In conjunction with this oil no acid at all is required at Cobar, as is necessary in the case of lead and zinc ores; in treating copper ores it is now becoming generally the practice to use oil without acid.

The labor required to watch the flotation plant proper, exclusive of fine grinding and other adjuncts to the process, was only one man on each shift.

Flotation at Cobar was found to be successful only on sulphide ores, and more particularly on sulphides exposing freshly broken and unoxidized surfaces. The presence of carbonates or sulphates was extremely obnoxious, decreasing the percentage of recovery and causing a much higher loss in the tailings.

E. G. Spilsbury.—Mr. Channing, what is the percentage of zinc in the Ducktown ores?

J. Parke Channing.—About 1½% zinc, nearly as much as the copper.

E. G. Spilsbury.—I heard the other day of a method for the separation of iron pyrites from blende, which is being tried in St. Lawrence County, N. Y., the Edwards mine, with apparently a great deal of success. They grind to 60-mesh, then pass over tables somewhat resembling the Deister, using on them a heavier flow of water and passing the material under a magnetic field. The result is that the attraction of the zinc blende is so relatively intense that it flows entirely over the iron pyrites and the separation is very clean. Of the valuable minerals in this ore, 40% is pyrites and 60% is blende. The blende concentrates contain 1½% pyrite and the pyrite concentrates less than 1% of blende; the line of demarcation is very clear on the table. It is quite an interesting development.

G. M. Colvocoresses.—On what scale are they conducting their experiments?

E. G. Spilsbury.—About 30 tons a day. They are now putting up a new plant, and have been carrying on experiments for some time.

T. T. Read.—The fact that the discussion has somewhat wandered away from the subject of flotation prompts me to remark that a number of the processes commonly included in a general discussion of this topic are not flotation processes at all. The Cattermole process, for example, was a sinking process, in which the oil was used to cause the sulphide particles to cohere in masses which would sink to the bottom. The original Elmore process was also decidedly different in principle from the true flotation processes, for it employed large quantities of oil which buoyed up the sulphides in much the same way that shipwrecked sailors are floated on a raft. The true flotation processes make use of the natural phenomenon that certain minerals, chiefly sulphides of the metals, are not so easily wetted by water as the ordinary gangue minerals, with the result that when finely powdered ore is sprinkled on a water surface these sulphides will float on the surface supported by the force of surface tension, while the wetted gangue minerals slip through this surface and sink in the mass of the liquid. This fundamental concept is embodied in the patent of Hezekiah Bradford, in 1885. The patents of Carrie J. Everson, in the same and succeeding years, brought out the fact that oil accentuates this tendency of the sulphides to float, just as an ordinary sewing needle can be floated on a water surface if it is first lightly greased. The point here is that if powdered ore is stirred up with oil, the oil adheres to the sulphides, rather than to the gangue minerals. This patent also brings out the further fact that if acid, or certain salts, be added to the water, its tendency to wet the gangue, and the tendency of the oil to grease the sulphide surfaces, are accentuated. It should be kept in mind that the exact significance of the operations proposed in these early patents was not so clear to the patentees as they are now to us, in the light of the knowledge acquired through the great volume of work since performed. To my way of thinking, these natural phenomena form the essential basis of all flotation processes. This does not affect the value of the subsequent patents in which the ranges of the use of oil, acid, agitation, and degree of comminution of the ore, which are essential to the practicable and commercially profitable use to the phenomena, are specified and claimed.

The method specified by Bradford and by some other patentees, for floating the sulphides on a quiet water surface was not commercially practicable, because if the sulphides failed to float when first brought upon the surface, no means were provided for bringing them up again and giving them another chance. Another fatal defect was that the carrying power of a surface is very small, since the force of surface tension is a weak one, and the capacity of the equipment was therefore so small as to preclude its use in mills of ordinary size. These two defects are obviated in the Macquisten tube, in which the powdered ore is continuously brought to the surface by the rotation of the tube, giving the sulphides ample opportunity to float, if they will do so. The limited capacity of the surface is partly overcome by the use of a moving current of water. This is beautifully overcome in the Minerals Separation process by violently agitating the mixture of ore and water until it froths. Each bubble thus produced has a surface which is as capable of floating the sulphides as was the original surface, and the area of the surface, to which its supporting power is proportional, is thus multiplied many thousands of times. The froth thus produced is astonishing to the average observer, but every man who, as a small boy, went swimming in the nearest mill pond must remember the large clots of tenacious froth, floating in some backwater, which awakened his juvenile curiosity.

Ore concentration by flotation is therefore a new art which employs natural phenomena which are really common but have hitherto escaped attention because of their inconspicuous character and because no useful application of them was known. The admirable, accurate, and highly scientific work which has been done by many investigators, but notably Messrs. Sulman and Picard, has not unnaturally operated to prevent the ordinary engineer from recognizing the simplicity of the essentials of the art.

H. H. Knox.—The Minerals Separation company refuses to make experiments with ore taken from the stock pile, for the well known reason that oxides refuse to float.

J. Parke Channing.—If porphyry copper ore is exposed to the atmosphere it starts to oxidize. We had 300,000 tons of ore on our dump at Miami, and quite a large amount of the copper became oxidized. Dr. Ricketts called my attention to the danger of oxidization in shrinkage stopes. Mr. Cates, at the Ray Consolidated, told me that he had driven 12,000 feet of drifts around the orebody for the purpose of carrying off storm water.

On motion of Mr. Huntoon, the meeting was adjourned at 10:15 p. m.

L. D. HUNTOON,
Secretary of Section.

PERSONAL

H. C. Bellinger has resigned from the management of the Great Cobar, Ltd., of New South Wales.

J. R. Finlay was in New York during December, but will return again to the lead district of Southeastern Missouri where he is engaged on important work for the St. Joseph Lead Co.

Prof. H. O. Hofman's new treatise on "General Metallurgy" is to be translated into German. The manuscript of his new treatise on the "Metallurgy of Copper" goes to the publishers this month.

William S. Mann has been made general superintendent of the Socorro Mines, Ltd., Valle de los Angeles, Honduras.

OBITUARY

Maurice B. Patch died December 2, while on a visit to his son-in-law at Derby, N. Y. His residence was in Buffalo. He was born at Otisfield, Maine, in 1852, and in 1872 graduated from the Massachusetts Institute of Technology as a mining engineer. His first appointment after graduating was as deputy United States engineer for the territory of Colorado. In 1874, however, he went to the Lake Superior copper country, and from that time on was engaged in the treatment of Lake Superior copper ores. For eight years he was chemist of the old Detroit & Lake Superior Copper Co. In 1882, he was made assistant superintendent and constructing engineer for that company. In 1886, he was appointed superintendent of the smelting works of the Calumet & Hecla Copper Co. at Lake Linden, Mich. In 1891, he was placed in charge of the Buffalo Smelting Works of the Calumet & Hecla as superintendent, retaining that position ever since. It need hardly be said that he was thoroughly versed in the treatment of lake ores and that his opinion on all questions connected with copper smelting was highly considered. He leaves a widow, three daughters and two sons, and many friends in the Lake Superior country and elsewhere.

Mining and Metallurgical Society
of America

CONSTITUTION BY-LAWS
RULES
OFFICERS MEMBERS

March 1, 1913

505 Pearl Street, New York

OFFICERS FOR 1913.

President, Henry M. Chance, 839 Drexel Bldg., Philadelphia.

Vice-President, J. R. Finlay, 52 William St., New York.

Secretary, }
Treasurer, } W. R. Ingalls, 505 Pearl St., New York.

Executive Committee: Messrs. H. M. Chance, J. R. Finlay, W. R. Ingalls, J. F. Kemp and H. S. Munroe.

COUNCIL.

At large, ex-officio.
Henry M. Chance, 839 Drexel Bldg., Philadelphia..Retires January, 1914
J. R. Finlay, 52 William St., New York..........Retires January, 1914
W. R. Ingalls, 505 Pearl St., New York..........Retires January, 1914

Districts 1-2-3.—New York and New England.
T. H. Leggett, 25 Broad St., New York..........Retires January, 1914
J. F. Kemp, Columbia University, New York... ..Retires January, 1915
H. S. Munroe, Columbia University, New York...Retires January, 1916

Districts 4-5.—New Jersey, Pennsylvania, West Virginia, Ohio and Maryland.
F. Lynwood Garrison, Philadelphia..............Retires January, 1915
R. A. F. Penrose, 460 Bullitt Bldg., Philadelphia...Retires January, 1916

District 6.—District of Columbia and Southern States.
Waldemar Lindgren, Boston, Mass...........Retires January, 1914

District 7.—Michigan, Minnesota, Wisconsin, Illinois, Iowa and Missouri.
H. V. Winchell, Minneapolis...................Retires January, 1914

District 8.—Colorado, Utah and Nevada.
Philip Argall, Denver..........................Retires January, 1915

Districts 9-10.—Oregon, Alaska, Northern California and Philippine Islands.
H. F. Bain, San Francisco......................Retires January, 1914
F. W. Bradley, San Francisco...................Retires January, 1915

District 11.—Arizona, Mexico, Texas, Oklahoma and Southern California.
S. W. Mudd, Los Angeles.......................Retires January, 1916

District 12.—Montana, Idaho, Washington and Canada.
C. W. Goodale, Butte..........................Retires January, 1916

OFFICERS OF SECTIONS.

SAN FRANCISCO.	NEW YORK.	PHILADELPHIA
S. B. Christy, *Chairman.*	Geo. C. Stone, *Chairman.*	R. H. Sanders, *Chairman.*
	E. G. Spilsbury, *Vice-Chairman.*	
T. T. Read, *Secretary.*	Louis D. Huntoon, *Secretary.*	F. Lynwood Garrison, *Secretary.*

Editor. Edward K. Judd

CONSTITUTION.

Amended, Oct. 4, 1911.

1—NAME.

The name of the association shall be MINING AND METALLURGICAL SOCIETY OF AMERICA.

2—OBJECTS.

The Society shall have for its objects the conservation of mineral resources, the advancement of mining and metallurgical industries, the better protection of mine investors and mine workers, the increase of scientific knowledge, and the encouragement of high professional ideals and ethics.

3—MEMBERSHIP.

The Society shall comprise honorary members, and members who must be qualified by knowledge, experience, and honorable standing to advance the objects of the Society, and shall be proposed for, and elected to, membership as provided in the by-laws of the society.

4—MEMBERS.

All interests in the property of the Society of persons resiging, or otherwise ceasing to be members, shall vest in the Society. No member or officer shall receive salary, compensation, or emolument unless authorized by the by-laws, or by concurring vote of two-thirds of the council. Members residing for a year or more beyond the limits of the United States, Canada and Mexico, shall not be entitled to vote nor to hold office during the period of such residence.

5—OFFICERS.

The affairs of the Society, subject to the provisions of the constitution and by-laws, shall be managed by a council of fifteen members, who shall hold office for the prescribed term or terms. The executive officers of the Society shall be a president, a vice-president, and a secretary (who shall also be treasurer), which officers shall be members of the council ex-officio, and shall hold office for one year, or until the close of the meeting at which their successors in office are elected, except that the secretary shall hold office until his successor accepts transfer of the duties of that office. Additional officers may be elected by the council from time to time if necessary for the purposes of the Society. All officers shall be eligible for re-election. Vacancy in the office of president shall be filled by the vice-president, who shall then become president, and the council shall forthwith elect a vice-president; and if necessary shall elect a member of council, of which the number must always be fifteen.

6—Annual Meeting.

The annual meeting of the Society shall be held on the second Tuesday in January of each year. One-third of the members, present in person or by proxy, shall constitute a quorum for the transaction of business.

7—Rules.

The Society may adopt by-laws, rules and regulations for the conduct of its business, provided that these are in harmony with this constitution, and may provide different methods for amending or repealing such by-laws, rules and regulations.

8—Amendments.

Amendments to the constitution may be presented at a regular or business meeting of the Society; and if endorsed by the council, or in writing signed by at least twenty members, a copy of such proposed amendment shall be sent to all entitled to vote, accompanied by comment by the council if it so elects, at least thirty days in advance of a second meeting called for its consideration; at which meeting the amendment may be amended as to wording but not as to intent, and then shall be submitted to a final vote by sealed letter ballot sent to all members; the polls shall be open for sixty days, and for the adoption of the amendment a majority of those entitled to vote shall be required to have been recorded in the affirmative; provided, however, that a negative vote comprising a majority of the votes cast shall defeat the amendment. If the necessary vote for adoption or for rejection is not secured on the first ballot, the council shall order the sending of a second ballot by registered mail to members who have not recorded their vote; and in such case, so many of these second ballots as have been received by members, if not voted within a further period of sixty days shall be counted as votes cast in the affirmative. The ballots shall be voted, canvassed and announced as provided in the by-laws.

BY-LAWS.

Amended Sept. 5 *and Oct.* 4, 1911.

1—Admission to Membership.

A candidate for membership or two members proposing him shall submit, in such form and in such detail as may be prescribed in the rules and regulations of the council, a record of his training and practice. The candidate must have had eight years' practical or professional experience, including not less than five years in positions of responsibility in mining or allied lines of work. Graduates of approved engineering schools shall be credited with one-half the time prescribed for graduation. The candidate must be endorsed by three or more members who shall further certify in writing as to his qualifications for membership. These statements must be based on long or intimate personal knowledge, and shall be submitted in such manner as the council may direct. The names of the candidates, after approval by a duly appointed committee of the council, shall be submitted to all members of the Society entitled to vote, with the request that said members of the Society present in writing promptly, any objections that they may have against a candidate on the list. Thirty days after the mailing of the list, the committee of the council shall consider the communications received from members of the Society, and with the approval of the committee, the secretary of the Society shall then submit the name of the candidate to the whole council for secret letter ballot. The affirmative votes of a majority of the council shall be required to elect, but three adverse votes, received within thirty days, shall be sufficient to defer the election of any candidate, and the council may include the name of any such candidate on the ballot for any subsequent election of members. The application of any candidate shall be considered as pending unless it be withdrawn, or unless by a majority vote of the council the candidate be rejected. A candidate may renew his application a year or more after his rejection.

2—Admission to Honorary Membership.

Honorary members, not to exceed ten in number, must be proposed in writing, setting forth at length the qualifications of the candidate, and signed by at least twenty members of the Society. The candidate must be elected by vote of the council which shall be by sealed letter ballot. One dissenting vote shall defeat such election. Honorary members are not entitled to vote nor to hold office and shall not be required to pay initiation fees nor annual dues.

3—Subscription to Constitution and By-Laws.

All elected candidates shall be duly notified, and shall subscribe to the constitution and by-laws in such form as the council may direct. This latter provision shall not apply to honorary members. The membership of any person shall date from the day of his election.

4—Initiation Fee.

There shall be an initiation fee of twenty-five dollars for each new member after the total membership shall have reached two hundred and fifty.

5—Annual Dues and Life Membership.

The annual dues shall be ten dollars, payable in advance on the first day of January of each year. Persons elected after nine months of any year have expired shall pay only one-half of the dues for that year. The council may, for sufficient cause, remit the whole or part of dues in arrears. The executive committee of the council may drop from membership any member more than one year in arrears for annual dues, but may reinstate such member at its discretion. The council shall permit any member, not in arrears, to become a life member on payment of a sum deemed adequate for the purpose by the council, and based on his expectation of life according to reliable tables of mortality. Such life membership and initiation fees shall be invested, and the income only shall be applied to the current expenses of the Society.

6—Resignations.

Any member, not in arrears in payment of dues, may terminate his connection with the Society by sending his resignation in writing to the secretary.

7—Discipline.

The membership of any person in the Society may be suspended or terminated for reasons of weight by a four-fifths vote of the council. Notice of such intended action shall be sent to such member by registered mail, and action shall not be taken for at least thirty days after the receipt of this notice by such member. A member suspended or expelled may demand a sealed letter ballot sustaining the action of the council. This ballot shall be sent to all members entitled to vote and may be accompanied by a statement signed by the council or a committee thereof, and by a statement on behalf of the accused of not more than one thousand words, or not exceeding in length that prepared by or for the council. A majority of the votes received within thirty days shall be required to reverse the action of the council.

8—ELECTION DISTRICTS.

The council shall from time to time divide the territory occupied by the membership into twelve geographical districts to be designated by numbers. Each of the districts shall be, as nearly as practicable, contiguous territory; and each shall contain as nearly as practicable an equal number of members. The council shall announce such division to the Society three months before the annual meeting. The council shall consist of the president, the vice-president and the secretary; and of twelve members, elected one from each district, and the terms of office of such twelve councillors shall be arranged so that four of them shall expire each year.

9—OFFICERS.

The officers of the Society, as provided in the constitution, shall be elected as hereinafter provided, except that whenever a vacancy occurs it shall be filled by a majority vote of the council. Their respective terms of office shall begin at the close of the meeting at which they are elected. The duties of the several officers shall be such as usually attach to the office, or such as may be determined by the council. The council may delegate its powers to persons or committees, and may make such rules and regulations as may be necessary for the proper conduct of the business of the Society, provided that these are in harmony with the constitution and by-laws.

10—COUNCILLORS.

The term of office of a councillor shall begin immediately upon election. Vacancies occurring at any time in the council may be filled until the next annual election by a majority vote of the remaining members. At the next annual election new councillors shall be elected to fill such vacancies for the unexpired terms of office only.

11—NOMINATIONS

Three months before the annual meeting, the secretary shall send a nomination ballot to each member of the Society in the districts for which new councillors must be elected, with the request that he shall nominate three members, in such manner as the council may direct, as candidates for councillor to represent his district; and shall send a nomination ballot to each member of the Society entitled to vote, with the request that he shall nominate one member for president, one for vice-president and one for secretary. Nominations shall be received for twenty days, when the polls shall be closed. Sixty days before the annual meeting the secretary shall prepare a ballot, containing in and for each of these districts not less than three names, and for the offices of president, vice-president and secretary, each, not less than three names, which shall be in each case those receiving the largest number of nominating votes before the closing of the polls. This ballot shall be mailed to each member of the Society entitled to vote, who may vote for one councillor in each district, having the right to substitute names not on the list, and to cast not over three votes for a single candidate, provided that the total number of votes cast by such member shall not exceed the total number of vacancies to be filled; and who may cast one vote for president, vice-president and secretary, respectively, having the right to substitute names not on the list. The ballot shall be signed, sealed and voted as prescribed in by-law 16.

12—Canvassing Ballots for Councillors.

At noon of the first day of the annual meeting the polls shall be closed and the ballots counted by two tellers appointed by the president. Councillors shall not be eligible for such appointment. The candidate for councillor in each district, and the candidate for the respective elective offices, receiving the largest number of votes, shall be elected. In case of a tie the president shall cast the deciding vote.

13—Meetings of Council.

Meetings of the council for the transaction of business may be called at any time by the president, and shall be called at the request in writing of three councillors. Unless for reasons of weight, at least ten days' notice of meetings shall be given. Five councillors, present in person or by proxy, shall constitute a quorum. A letter ballot of the council shall be taken on any question of importance, if so ordered by the presiding officer at any meeting, or at the request in writing of three councillors. Whenever a letter ballot of the council be taken, a majority vote of the council shall be required to pass the motion put to ballot, except that letter ballots upon candidates for admission to membership shall be decided as provided in by-law 1.

14—MEETINGS OF THE SOCIETY.

The council shall provide for regular stated meetings of the Society, for the transaction of business, or for the reading or discussion of papers, to be held at such times and places as may best serve the interests of the Society. Special meetings of the Society, or of any section thereof, for a definite purpose, may be called by the president, or shall be called on a request in writing signed by twenty members. It shall not be in order at a special meeting to transact other business than that stated in the call for the meeting. Except for reasons of weight, at least thirty days' notice shall be given of all meetings. Except at annual meetings, ten members present in person or by proxy shall constitute quorum. Resolutions endorsing or condemning matters of public or professional interest shall take such course as may be prescribed by the council in duly formulated rules, but such rules must provide that not less than thirty days be allowed for any ballot of the membership of the Society.

15—LOCAL OR PROFESSIONAL SECTIONS.

Local sections, or professional groups of members of the Society, may be organized for social, scientific and professional purposes, in harmony with the constitution and by-laws, and such sections shall have only such powers, and shall act under such rules and regulations, as the council may from time to time approve.

16—SEALED LETTER BALLOTS.

When sealed letter ballots are required by the constitution or by-laws, the envelope to contain the ballot shall be so designed that it can be signed on the outside by the voter for identification, and can afterward be opened by the tellers so as to preserve the secrecy of the ballot. The endorsement may take the form of a proxy, to be voted by the tellers appointed by the president, or by such other person, not a councillor, as the member may designate. The ballots signed and sealed shall be mailed or delivered to the secretary, who shall be responsible for their safe-keeping, and who shall endorse thereon the date and time of receipt and make record of such receipt on a list of members kept for the purpose. Any member shall have the privilege, at any time before the closing of the polls, of substituting another ballot, in which case the original shall be returned to him unopened. After the closing of the polls, the ballots, arranged in alphabetical order, with the check list of members above mentioned, shall be delivered by the secretary to tellers appointed by the president. The tellers shall verify the check list, and open and mix thoroughly the votes in such manner as to preserve the secrecy of the ballot. The ballots after being counted by the tellers, shall be destroyed, and the report of the tellers shall be the official record of the vote. In case a supplementary ballot shall be ordered for members failing to vote on the first ballot, the members whose votes have been counted shall not be permitted to vote a second time nor to change their original vote. The result of the ballot shall be communicated to the members of the Society at such time and in such manner as the council shall determine.

17—Vote of Confidence.

The council, by a two-fifths vote of its members, or upon request in writing of twenty per cent. of the members of the society, shall submit any question to the membership for a vote of confidence. Such vote must be inaugurated within fifteen days after a motion for a vote of confidence has been passed; and the majority of votes received within thirty days after issuance of the ballot shall decide. In case such question is decided against the council, the members thereof shall forthwith resign office, their resignations to take effect on the election of their successors, and a new election of the whole council shall be immediately ordered to be conducted as provided in the by-laws. The new councillors shall by lot divide themselves into three classes to serve until the next annual meeting and for one and two years thereafter respectively.

18—Amendments to By-Laws.

Amendments to the by-laws shall take the course provided for amendments to the constitution, save that when the letter ballot is taken a majority of the votes received within thirty days shall pass or defeat such amendments.

RULES AND REGULATIONS

A.—Rules Governing Resolutions.

1. Resolutions upon matters of interest to the Society, or upon matters that it is desired to submit to the entire membership of the Society, other than amendments to the constitution and by-laws, may be introduced at any meeting of any local section. Upon adoption by such section, the secretary of the section shall communicate the resolution as adopted to the secretary of the Society, who shall promptly lay it before the council. The council, after consideration of such resolution, shall (1) submit it to the membership of the Society for vote by letter ballot as provided in the by-laws; or (2) make such amendment as in the opinion of the council is desirable, without, however, altering the intention of the resolution, and then shall submit it to vote by the Society; or (3) reject the resolution and return it to the section that communicated it, with the reason for rejection.

2. A local section when notified by the council of the rejection of a resolution may reiterate that resolution; and upon receipt by the council of report of such action, the council shall then promptly submit the resolution to the membership of the Society, without amendment, but the council may accompany the resolution with a memorandum respecting its own action in the case.

3. If the council receives resolutions bearing upon the same subject from two or more local sections, the council shall select for submission to the Society that which in its opinion is the most adequate for the purpose intended; or the council may frame a composite resolution, to which new matter may be added, and shall submit such resolution to the membership of the Society as a resolution proposed by the council in lieu of those adopted by two or more local sections.

4. Any seven members of the Society, not affiliated with any local section, may unite in presenting a resolution to the council, and the council shall act upon such a presentation in the same way as provided under rule 1.

5. The council itself may initiate a resolution and submit it directly to the membership of the Society for letter ballot.

B.—Rules Governing Local Sections.

1. Local sections of the Society may be formed for promoting social intercourse among members, and for reading papers, and discussing subjects pertinent to the objects of the Society,

and not inconsistent with the constitution and by-laws of the Society.

2. Such sections may be organized wherever there be 15 members in any city or town, or in places adjacent thereto, upon the request of 10 or more of such members addressed to a councillor, who may thereupon call a meeting of members residing within the limits of the proposed section, and if not less than seven members attend such meeting, they may thereupon organize such section, elect officers, comprising at least a chairman and a secretary, and adopt rules and regulations for their local government, not inconsistent with the constitution and by-laws of the Society; provided that said rules and regulations, or any subsequent amendment thereof, shall forthwith be submitted to the council of the Society, and shall not become effective until approved by the council; and provided, that all members of the Society residing or engaged professionally in the district included by any section shall be invited to become members of said section; and provided that any such member, upon application and upon complying with the rules and regulations of said section, shall be admitted to membership therein; and provided that all expenses incurred by said section, except as noted below, shall be defrayed by said section.

3. The secretary of each local section shall notify the secretary of the Society as to the names of members enrolled in his section and shall promptly inform the secretary of the Society respecting any resignations from or additions to membership. In the event of any dispute as to membership, or the right to enroll members, the matter shall be referred to the council of the Society, whose decision shall be final.

4. The Society will pay, on request, two-thirds of the actual cost of stenographic reports of the meetings of any section, provided that the amount so paid does not exceed one-half the dues paid into the general treasury by the members of such section, nor exceed $100 in any one year.

5. Dues or assessments for the defrayment of the expenses of local sections shall be levied as each section shall determine, but shall not exceed $5 per member in any one year. The failure of any member to pay such section-charges shall be reported to the council of the Society and delinquency for more than one year after notice has been served shall be a reason sufficient for the suspension or termination of the membership in the Society of such delinquent member. Any member not in arrears in payment of section-charges may terminate his connection with any section by written notification

to the secretary thereof. If by resignation, or otherwise, the membership of any local section shall fall below 15, the existence of such section may be terminated by the council.

6. The proceedings of local sections, including papers and discussions, shall be reported to the secretary as hereinafter provided. No section shall, without the approval of the council of the Society, permit any account of its proceedings or of its papers or discussion to be printed in any newspaper or technical publication, nor shall any such section print or publish any proceedings, without the assent and approval of said council, nor issue any printed matter, except the necessary notices, etc., relating to the management of the section. No section shall at any time perform any act or deed which is properly a function of the Society.

7. The geographical limits of each local section shall be subject to such amendment or limitation as the council of the Society may from time to time determine.

8. All members of the Society shall have the right to attend all meetings of all sections.

9. Honorary members of the Society shall be exempt from dues to any local section.

10. The order of business at meetings of local sections shall be:
   a. Reading of minutes of previous meeting.
   b. Transaction of business.
   c. Discussion of professional and technical questions.

11. The proceedings at each meeting of each section shall be promptly reported by the section-secretary to the secretary of the Society.

C.—Rules for Award of Annual Medal.

1. A gold medal shall be awarded by this Society each year for conspicuous professional or public service for the advancement of the science of Mining, of Metallurgy, or of Economic Geology; for the betterment of the conditions under which these industries are carried on, for the protection of mine investors, and especially for the better protection of the health and safety of workmen in mines and metallurgical establishments.

2. This medal shall be awarded at the annual meeting of the Society in January.

3. Six months before the award the Secretary shall send a circular letter to all members requesting suggestions as to the specific object for which the medal shall be awarded and

asking for the nomination of candidates on a form provided for the purpose, such nominations to be accompanied by a full statement of the claims of the candidates for consideration. These nominations shall not be confined to members of the Society and may include other nationalities than our own.

4. Four months before the award of the medal the Council shall determine the specific object for which the medal is to be awarded. All nominations of candidates whose claims to recognition lie in that special field of work shall then be considered by a committee of three to be appointed by the President. At least two months before the award this committee shall submit a list of two names to the Council with full statement of the claims of each candidate. The committee may consider and recommend names not nominated by members of the Society. The names so recommended shall be submitted to the Council for election by letter ballot.

5. For the election of a candidate a majority vote of the Council shall be necessary. If this majority be not obtained on the first election other ballots may be taken either by letter or at a meeting of the Council called for the purpose. At such meeting members of the Council may be represented in proxy.

LOCAL RULES.

NEW YORK SECTION.

1. The officers of the New York Section of the Mining and Metallurgical Society of America shall be a chairman, a vice-chairman and a secretary, who shall be elected at the first meeting after the summer of each year, and shall hold office for one year from that time. These officers shall constitute the executive committee of the section.

2. The expenses incurred by the section shall be divided equally among all its members, and shall be payable at such times as the executive committee shall name.

3. In the absence of the chairman and vice-chairman, the meeting shall elect a chairman *pro tem*, to serve at that meeting. In the absence of the secretary, the chairman shall appoint an acting secretary to serve for that meeting.

4. The secretary shall keep a record of the proceedings of the meetings, and immediately after each meeting shall forward to the general secretary of the Society a report of the proceedings.

5. The presence of seven members of the section at a meeting shall constitute a quorum.

6. Members shall have the privilege of bringing guests to ordinary meetings of the section, but not to meetings previously announced as executive.

PHILADELPHIA SECTION.

1. The officers of the Philadelphia Section of the Mining and Metallurgical Society of America shall be a chairman and a secretary, who shall be elected at the first meeting after the summer of each year, and shall hold office for one year after that time.

2. The expenses incurred by the section shall be equally divided among all members of the section, and shall be payable at such times as the chairman may name.

3. In the absence of the chairman, a meeting shall elect a chairman *pro tem.* to serve at that meeting. In the absence of the secretary, the chairman shall appoint an acting secretary to serve for that meeting.

4. The secretary shall keep a record of the proceedings of the meetings, and immediately after each meeting shall forward to the general secretary of the Society a report of the proceedings.

5. The members of the section shall have the privilege of bringing guests to the meetings of the section.

ANNOUNCEMENT

Adopted by the Council and published in the first bulletin of the Society.

It has been decided by the council of the Mining and Metallurgical Society of America to issue to the members a monthly bulletin similar to this, which will record the proceedings of the Society. In presenting this, the first bulletin of the Society, it is deemed desirable to outline the purposes of the Society suggested in the preliminary correspondence among those who became the charter members and developed in the discussion at the organization meeting. It is contemplated that the Society will enter immediately into five principal fields of activity, as follows:

(1) The establishment of local sections, to promote acquaintance among the members, good fellowship, and the inter-

change of views respecting technical and professional matters. It is intended that these local sections shall hold frequent meetings, probably once a month, all of the sections to hold their meetings on the same day. It has been suggested that these meetings take the form of a dinner, or smoker, to be followed by conversation and discussion. Such action as may be taken upon matters of interest will be reported to the general secretary and published in the monthly bulletin of the Society. If in the opinion of the council of the Society any matter be of such general importance as to deserve discussion by all of the sections, they will be requested by the general secretary to take it up. In addition to the meetings of the local sections, there will be in each year at least one meeting of the whole Society.

(2) The determination of standards in engineering practice, such as is being done by the Institution of Mining and Metallurgy. The Institution has from time to time appointed committees to consider technical questions as to which there is confusion, with the view to recommending a standard of practice that all members of the Institution are urged to adopt. Among the questions that have been taken up by the Institution of Mining and Metallurgy are the definition of what constitutes the development of ore, the establishment of a standard of screens for use in screen analysis, and an agreement as to weights and measures commonly employed in mining and metallurgical work. Efforts to secure standardization and uniformity of methods have also been made by other technical societies. There is a great field for useful work in this direction, and it is considered to be one that the Mining and Metallurgical Society of America may profitably enter.

(3) The discussion of questions relating to professional practice and ethics, with a view to the gradual formulation of rules for guidance, determined by the consensus of opinion in the Society. Mining and metallurgical engineers are accustomed to speak of themselves as professional men, but in their actions they often show that they do not seriously regard themselves as such. This may be due to a large extent to vagueness in ideas respecting professional propriety. Consequently, it is considered that the Mining and Metallurgical Society of America will serve a useful purpose in discussing details of professional practice, such as the relation between the engineer and his clients, the matter of contingent fees, the communications of gratuitous advice. These are merely a few matters which suggest themselves. It is considered that a discussion of such questions relating to professional practice and ethics will lead eventually to the establishment of a code of ethics, developing the brief but comprehensive treatise on this subject by Sir Fran-

cis Bacon in the preface to his "Maximums of the Law" as follows: "I hold every man a debtor to his profession; from the which as men of course do seek to receive countenance and profit, so ought they of duty to endeavor themselves by way of amends to be a help and ornament thereunto."

(4) The discussion of questions of public policy in which the profession of mining engineering is directly concerned. There are many questions arising in connection with the federal and state governments, which have a direct bearing upon the interests of the mining and metallurgical engineer, just as in the case of other professional men. For example, there has lately been a movement in the State of New York to compel every analytical chemist to secure a license from the State before being permitted legally to practice his profession; similarly it has been suggested that the states should pass laws requiring mining engineers to be licensed. It is no part of the present purpose to discuss or put any weight upon these particular propositions; they are mentioned merely as examples of matters of public policy which come up from time to time, affecting the profession of mining and metallurgical engineering, in connection with which the profession has heretofore had no means of expressing the consensus of its opinion. The Mining and Metallurgical Society of America will be a medium for the expression of such opinions.

(5) Finally, it is intended that the Mining and Metallurgical Society of America shall be a strictly professional society, i. e., membership in it will be limited to the ranks of the mining and metallurgical engineers, and mining geologists. Serious qualifications are prescribed as a prerequisite to membership, and it is the purpose of the founders of the Society to maintain a high standard of personal character and professional ability among the membership. In pursuance of this policy, applications for membership will be subjected to rigid investigation in substantially the same way as is done by the American Society of Civil Engineers. It is hoped that this will cause the Mining and Metallurgical Society of America soon to become recognized as representative of the best in the mining and metallurgical profession of North America. Membership in the Society obviously will not be an unqualified endorsement, but it will be a recognition of good standing among and by members of the profession, which in many ways will be useful. It is proposed in the list of members of the Society to print brief records of their professional careers.

CERTIFICATE OF INCORPORATION

We, the undersigned, being desirous of associating ourselves together as a non-stock membership corporation, for scientific, educational and social purposes, as hereinafter more particularly set forth and described, pursuant to and in conformity with the Acts of Legislature of the State of New York relating to membership in non-stock corporations, do hereby certify and declare that we are all of full age, all of us are citizens of the United States, two of us are residents of the City, County and State of New York, and one of us is a resident of the City and State of New York and all of us have had at least eight years' practical or professional experience, including not less than five years of responsibility in mining or allied lines of work.

We do further certify and declare that the particular objects for which this corporation is to be formed, and the qualifications required for active membership therein are as follows; viz.,

First. To bring together, as Honorary Members and Members, those who are qualified by knowledge, experience and honorable standing acquired by at least eight years of practical or professional experience, including not less than five years in positions of responsibility in mining or allied kinds of work, for the specific purpose of thereby advancing the particular objects of the Society, to wit: the conservation of mineral resources, the advancement of mining and metallurgical industries, the better protection of mine investors and mine workers, the increase of scientific knowledge, the encouragement of high professional ideals and ethics, and the cherishing of the spirit of brotherhood among its members.

Second. That the corporate name by which said corporation, hereby to be formed, shall be known and distinguished, is and shall be:—Mining and Metallurgical Society of America.

Third. That the territory in which the operations of said corporation are to be principally conducted is the United States of America, Canada and Mexico.

Fourth. That the principal office of said corporation shall be located in the Borough of Manhattan, City, County and State of New York.

Fifth. That the number of directors of the said corporation shall be fifteen.

Sixth. That the names and places of residence of the persons to be the directors of said corporation until the first annual meeting, are

Walter R. Ingalls, 505 Pearl Street, New York City.
Henry S. Munroe, Columbia University, New York City.
Robert H. Richards, Massachusetts Institute of Technology, Boston, Mass.
William A. Lathrop, 108 South Fourth Street, Philadelphia, Pa.
Henry M. Chance, 819 Drexel Building, Philadelphia, Pa.
William N. Page, 1863 Kalorama Road, Washington, D. C.
Horace V. Winchell, 505 Palace Building, Minneapolis, Minn.
Ernest R. Buckley, Rolla, Missouri.
J. Parke Channing, 42 Broadway, New York City.
Joseph Hyde Pratt, Chapel Hill, North Carolina.
Charles W. Goodale, care Boston & Montana Cons. C. & S. Mng. Co., Butte, Montana.
Philip Argall, 730 Majestic Building, Denver, Colorado.
Frederick W. Bradley, Crocker Building, San Francisco, Cal.
John C. Branner, Stanford University, Cal.
Samuel B. Christy, University of California, Berkeley, Cal.

Seventh. That the annual meeting of said corporation shall be held on the second Tuesday of January in each and every year.

Eighth. That the duration of the corporation shall be thirty years.

In Testimony Whereof, we have made, signed and sealed this certificate in duplicate, and have hereunto set our hands and affixed our respective seals this day of , one thousand nine hundred and ten.

(Signed) HENRY S. MUNROE, (Seal)
Columbia University, New York City.

(Signed) WALTER R. INGALLS, (Seal,)
505 Pearl St., New York City.

(Signed) ROBERT H. RICHARDS, (Seal)
Massachusetts Institute of Technology, Boston, Mass.

(Signed) HENRY M. CHANCE, (Seal)
819 Drexel Bldg., Philadelphia, Pa.

(Signed) J. PARKE CHANNING, (Seal)
42 Broadway, New York City.

The above certificate was signed and acknowledged on dates between Nov. 18 and Nov. 28, 1910, and was filed with the Secretary of State of New York on Dec. 2, 1910, and in the County of New York on Dec. 5, 1910.

MEMBERS.

March 1, 1913.

Aldridge, W. H. .... 14 Wall St., New York
Managing Director, Inspiration Copper Company.

Allen, John H. .... 82 Beaver St., New York City
Consulting Metallurgist, Knox & Allen.

Appleby, William R. .... Minneapolis, Minn.
Prof. of Metallurgy, State University.

Argall, Philip .... First National Bank Bldg., Denver, Colo.
Consulting Mining Engineer.

Arnold, Ralph .... 917 Union Oil Bldg., Los Angeles, Cal.
Consulting Geologist and Mining Engineer.

Austin, L. S. .... 251 W. 2d North St., Salt Lake City, Utah
Consulting Metallurgist.

Bain, H. Foster .... 420 Market St., San Francisco, Cal.
Editor, *Mining and Scientific Press.*

Ball, Sydney H. .... 71 Broadway, New York
Mining Geologist.

Beeler, H. C. .... 1004 First National Bank Bldg., Denver, Colo.
Consulting Mining Engineer.

Bellinger, Herman C. .... Cobar, N. S. W.
Metallurgical Engineer; Gen. Mgr., Great Cobar, Ltd.

Benjamin, Edward H. .... 75 Fremont St., San Francisco, Cal.
President, Joshua Hendy Iron Works.

Boutwell, J. M. .... 1323 de la Vina St., Santa Barbara, Cal.
Mining Geologist.

Bradley, F. W. .... Crocker Bldg., San Francisco, Cal.
President, Bunker Hill & Sullivan M. & C. Co.

Bradley, Philip Read .... Crocker Bldg., San Francisco, Cal.
Consulting Mining Engineer.

Branner, J. C. .... Stanford University, Cal.
Prof. of Geology, and Vice-President, Stanford University.

Brayton, Corey C. .... Room 408, 311 California St., San Francisco, Cal.
Mining Engineer.

Bretherton, S. E. .... 220 Mills Bldg., San Francisco, Cal.
Consulting Mining Engineer; Mgr., Afterthought Copper Co.

Brock, Reginald W. .... Ottawa, Canada
Director, Geological Survey of Canada.

Brooks, A. H. .... Washington, D. C.
Geologist, U. S. Geological Survey.

Brown, R. Gilman .... 62 London Wall, London, E. C., England
Consulting Mining Engineer.

Browne, Ross E. .... 234 Perry St., Oakland, Cal.
Mining Engineer.

Buck, Stuart M. .... Bramwell, W. Va.
Mining Engineer.

Burch, Albert .... Crocker Bldg., San Francisco, Cal.
Mining Engineer.

Burgess, John A. .... Wonder, Nev.
Supt., Nevada Wonder Min. Co.

Butters, Charles........................333 Kearny St., San Francisco, Cal.
Mining Engineer and Metallurgist.

Caetani, Gelasio........................Crocker Bldg., San Francisco, Cal.
Consulting Mining and Metallurgical Engineer.

Cairns, F. I..Houghton, Mich.
Supt., Michigan Smelting Co.

Cates, Louis Shattuck..Ray, Ariz.
Mgr., Ray Consolidated Copper Co.

Catlin, Robert M..................................Franklin Furnace, N. J.
Engineer, New Jersey Zinc Co.

Chance, H. M.............................839 Drexel Bldg., Philadelphia, Pa.
Consulting Mining Engineer and Geologist.

Channing, J. Parke...........................42 Broadway, New York City
Consulting Mining Engineer.

Chase, Charles A..............734 First National Bank Bldg., Denver, Colo.
Consulting Mining Engineer.

Chase, Edwin E..........................1450 William St., Denver, Colo.
Mining Engineer.

Chauvenet, S. H..Sheridan, Pa.
Manager, Berkshire Iron Works.

Christy, S. B..Berkeley, Cal.
Prof. of Mining and Metallurgy, University of California.

Claghorn, C. R...Tacoma, Wash.
Gen. Mgr., Northwestern Improvement Co.

Clark, C. D...................................165 Broadway, New York
Mining Engineer, W. Rowland Cox & Staff.

Clark, W. B..Baltimore, Md.
State Geologist; and Prof. of Geology, Johns Hopkins University.

Clements, J. Morgan........................20 Broad St., New York City
Mining Engineer and Geologist.

Clevenger, G. Howell...................................Palo Alto, Cal.
Associate Prof. of Metallurgy, Stanford University.

Cobb, Collier...Chapel Hill, N. C.
Prof. of Geology, University of North Carolina.

Collins, George E........................418 Boston Bldg., Denver, Colo.
Mining Engineer.

Comstock, Theodore B................Room 30, City Hall, Los Angeles, Cal.
Mining Engineer.

Conner, Eli T................1134 Real Estate Trust Bldg., Philadelphia, Pa.
Consulting Mining Engineer.

Corning, Christopher R......................36 Wall St., New York City
Consulting Mining Engineer.

Cottrell, F. G.............................2332 Fulton St., Berkeley, Cal.
Physical Chemist, U. S. Bureau of Mines.

Cowles, Alfred H...Sewaren, N. J.
Metallurgist; Pres., Electric Smelting & Aluminum Co.

Cox, W. Rowland..........................165 Broadway, New York City
Mining Engineer.

Crosby, W. O...Boston, Mass.
Prof. of Geology, Massachusetts Institute of Technology.

Crowell, Benedict.....................407 Perry-Payne Bldg., Cleveland, O.
Consulting Mining Engineer.

Darton, N. H. .... Washington, D. C.
Geologist, U. S. Bureau of Mines.

Derby, C. C. .... Nevada City, Cal.
Mining Engineer.

d'Invilliers, E. V. .... 506 Walnut St., Philadelphia, Pa.
Mining Engineer.

Dorr, John V. N. .... 728 Equitable Bldg., Denver, Colo.
Consulting Metallurgical Engineer.

Douglas, James Stuart .... Douglas, Ariz.
Mine Owner and Banker.

Drake, Francis .... Box 249, Bulawayo, Rhodesia
Consulting Mining Engineer for Lewis & Marks.

Drinker, Henry S. .... South Bethlehem, Pa.
President, Lehigh University.

DuBois, H. W. .... 302 Harrison Bldg., Philadelphia, Pa.
Mining Engineer.

Dufourcq, E. L. .... Produce Exchange Building, New York
Mining Engineer.

Dumble, E. T. .... 2003 Main St., Houston, Tex.
Geologist.

Duncan, Murray M. .... Ishpeming, Mich.
Gen. Mgr., Cleveland-Cliffs Iron Co.

Dwight, Arthur S. .... 25 Broad St., New York
President, Dwight & Lloyd Metallurgical Co.

Easton, Stanly A. .... Kellogg, Idaho
Mining Engineer; Mgr., Bunker Hill & Sullivan M. & C. Co.

Eurich, Ernst F. .... 15 William St., New York City
Consulting Mining Engineer.

Fairchild, S. E., Jr. .... 530 Land Title Bldg., Philadelphia, Pa.
Mining Engineer.

Farish, John B. .... 603 Colorado Bldg., Denver, Colo.
Consulting Mining Engineer.

Finch, John Wellington .... 730 Symes Bldg., Denver, Colo.
Consulting Mining Geologist and Engineer.

Finlay, J. R. .... 52 William St., New York City
Consulting Mining Engineer.

Fitch, Walter .... Eureka, Utah
Pres. and Gen. Mgr., Chief Cons. Mining Co., etc.

Foote, Arthur DeWint .... Grass Valley, Cal.
Mining Engineer.

Fowler, Samuel S. .... Drawer 1024, Nelson, B. C.
Mining Engineer and Metallurgist.

Fuller, John T. .... 505 Park St., Honesdale, Pa.
Consulting Mining Engineer.

Fulton, Charles H. .... Cleveland, O.
Prof. of Metallurgy, Case School of Applied Science.

Garrison, F. Lynwood .... 760 Drexel Bldg., Philadelphia, Pa.
Mining Engineer.

Gemmell, Robert C. .... McCornick Bldg., Salt Lake City, Utah
Asst. Gen. Mgr., Utah Copper Co.

Goodale, Charles W. .... Butte, Mont.
Mgr., B. & M. Dept., Anaconda Copper Mining Co.

Gottsberger, B. Britton..........Miami, Ariz.
Gen. Mgr., Miami Copper Co.

Grant, U. S..........Evanston, Ill.
Prof. of Geology, Northwestern University.

Griffith, William..........Coal Exchange Bldg., Scranton, Pa.
Mining Engineer.

Guernsey, F. W..........Bankhead, Alberta
Mining Engineer, Canadian Pacific Railway Co.

Haas, Frank..........Fairmont, W. Va.
Consulting Engineer, Consolidation Coal Co.

Halberstadt, Baird..........Pottsville, Pa.
Mining Geologist.

Hartranft, Samuel S..........Norristown, Pa
Metallurgical Engineer.

Harvard, Francis T..........Madison, Wis.
Prof. of Metallurgy, University of Wisconsin.

Hayes, C. Willard..........Tampico, Tamps., Mex.
Gen. Mgr., Exploitation Dept., Cia. Mexicana de Petroleo "El Aguila."

Hellmann, Fred..........Chuquicamata, via Antofagasta, Chile
Consulting Mining Engineer.

Hersam, Ernest A..........Berkeley, Cal.
Associate Prof. of Metallurgy, University of California.

Hess, Frank L..........Washington, D. C.
Geologist, U. S. Geological Survey.

Hill, Frank A..........512 S. Centre St., Pottsville, Pa.
Mining Engineer.

Hixon, Hiram W..........Aire Libre, Puebla, Mex.
Supt., Teziutlan Copper Co.

Hoffmann, Aug. O..........Handtverkargatan 15, Stockholm, Sweden
Mining and Metallurgical Engineer.

Hofman, H. O..........Boston, Mass.
Prof. of Metallurgy, Mass. Inst. of Technology.

Holden, Edwin C..........Madison, Wis.
Consulting Engineer; Prof. of Mining, University of Wisconsin.

Holmes, Joseph A..........Washington, D. C.
Director, United States Bureau of Mines.

Hoover, Herbert C..........71 Broadway, New York
Consulting Mining Engineer.

Howe, Ernest..........77 Rhode Island Ave., Newport, R. I.
Geologist.

Huntley, Dwight B..........Apartado 12, Concepcion del Oro, Zacatecas, Mex.
Mining Engineer, care Santa Rosa Mining Co., Ltd.

Huntoon, Louis D..........165 Broadway, New York
Consulting Mining Engineer.

Hutchins, J. P..........341 Salisbury House, London, E. C., England
Mining Engineer.

Hutchinson, E. S..........Newtown, Pa.
Civil and Mining Engineer.

Ingalls, W. R..........505 Pearl St., New York City
Mining Engineer; Editor, *Engineering and Mining Journal.*

Irving, J. D..........New Haven, Conn.
Mining Engineer; Prof. of Geology, Sheffield Scientific School.

Jackling, Daniel C..........Salt Lake City, Utah
General Manager, Utah Copper Co.

Jennings, Hennen..........2221 Massachusetts Ave., Washington, D. C.
Consulting Mining Engineer.

Jennings, Sidney J..........42 Broadway, New York City
Vice-Pres., U. S. Smelting, Refining and Mining Co.

Jopling, James Edmund..........321 Cedar St., Marquette, Mich.
Chief Engineer, Cleveland-Cliffs Iron Co.

Keating, John B..........Winthrop, Shasta Co., Cal.
Mgr., Bully Hill Copper Mg. and Smg. Co.

Keith, Frank A..........713 Central Bldg., Los Angeles, Cal.
Consulting Mining Engineer.

Kelly, William..........Vulcan, Mich.
Gen. Mgr., Penn. Iron Mining Co. and Republic Iron Co.

Kemp, J. F..........New York City
Prof. of Geology, Columbia University.

Kennedy, Eugene P..........Treadwell, Alaska
Asst. Supt., Alaska-Treadwell Gold Mining Co.

Keyes, Charles R..........944 Fifth St., Des Moines, Iowa
Geologist.

Kimball, Edwin B..........209 Hillside Ave., Piedmont, Cal.
Gen. Mgr., Esperanza Consolidated Oil Co.

Kinzie, Robert Allen..........Treadwell, Alaska
Gen. Supt., Alaska-Treadwell, Alaska-Mexican, Etc.

Kirby, Edmund Burgis..........701 Security Bldg., St. Louis, Mo.
Consulting Mining and Metallurgical Engineer.

Knox, H. H..........82 Beaver St., New York City
Mining Engineer.

Ladd, George E..........Wilburton, Okla.
President, Oklahoma School of Mines.

Laird, George A..........Minas de San Pedro, Chih., Mex.
Mgr., Candelaria Mining Co.

Lawall, Elmer H..........Wilkesbarre, Pa.
Mining Engineer.

Lawrence, Benjamin B..........60 Wall St., New York
Consulting Mining Engineer.

Lawson, A. C..........Berkeley, Cal.
Prof. of Geology, University of California.

Lawton, Charles L..........Hancock, Mich.
Gen. Mgr., Quincy Mining Co.

Leggett, Thomas H..........165 Broadway, New York
Consulting Mining Engineer, American Smelting & Refining Co.

Lessner, Charles B..........Carril, Spain
Metallurgist.

Lewis, J. Volney..........New Brunswick, N. J.
Prof. of Geology and Mineralogy, Rutgers College.

Lindgren, Waldemar..........Boston, Mass.
Head of Dept. of Geology, Mass. Inst. of Technology.

Lindsley, Halstead..........Silver Centre, Ont.
Consulting Mining Engineer.

Loring, Frank C..........Home Life Bldg., Toronto, Ont.
Mgr., Wettlaufer-Lorrain Silver Mines, Ltd.

Lyman, Benjamin Smith..........708 Locust St., Philadelphia, Pa.
Mining Engineer.

Lyon, Dorsey A. .... Box 83, Oakland Sta., Pittsburgh, Pa.
Metallurgist.

McClelland, James F. .... Drawer C., Yale Sta., New Haven, Conn.
Prof. of Mining Engineering, Yale University.

McCreath, Andrew S. .... Harrisburg, Pa.
Consulting Chemist.

MacNaughton, James W. .... Calumet, Mich.
Gen. Mgr., Calumet & Hecla Mining Co.

Magnus, Benjamin .... Mount Morgan, Queensland
Gen. Mgr., Mount Morgan Gold Mining Co.

Malcolmson, J. W. .... 3728 Main St., Kansas City, Mo.
Mining Engineer.

Mann, William S. .... San Juancito, Honduras, C. A.
Engineer, N. Y. & Honduras Rosario Mining Co.

Mein, William Wallace .... 43 Exchange Pl., New York
Gen. Mgr., Canadian Mining & Exploration Co., Ltd.

Melzer, Gustav Emil .... Baker City, Ore.
Consulting Mining Engineer and Metallurgist.

Mendenhall, W. C. .... Washington, D. C.
Geologist, U. S. Geological Survey.

Mercer, John W. .... 15 Broad St., New York City
Mine Manager.

Merriam, W. N. .... Duluth, Minn.
Geologist.

Merrill, Chas. W. .... 143 Second St., San Francisco, Cal
Consulting Metallurgical Engineer.

Merrill, F. J. H. .... 624 Citizens National Bank Bldg., Los Angeles, Cal.
Consulting Mining Engineer.

Metcalfe, G. W. .... Kennett, Cal.
Manager, Mammoth Copper Mining Co.

Moore, P. N. .... 611 Merchants' Laclede Bldg., St. Louis, Mo.
Mining Engineer.

Morley, F. H. .... Symes Bldg., Denver, Colo.
Mining Engineer.

Mudd, Seeley W. .... 1001 Central Bldg., Los Angeles, Cal.
Mining Engineer.

Munro, Charles H. .... 1043 Monadnock Bldg., San Francisco, Cal.
Gen. Mgr., Wild Goose Mining and Trading Co.

Munroe, H. S. .... New York City
Prof. of Mining, Columbia University.

Newsom, John F. .... Stanford University, Cal.
Associate Prof. of Mining, Stanford University.

Nichols, Ralph .... Gilmore, Idaho
Consulting Mining and Metallurgical Engineer.

Norris, Robert Van A. .... 520 Second Nat. Bank Bldg., Wilkesbarre, Pa.
Consulting Mining Engineer.

Noyes, William S. .... 819 Mills Bldg., San Francisco, Cal.
Pres., Butte Dredging Co., El Oro Dredging Co.

Nutter, Edward H. .... Merchants' Exchange Bldg., San Francisco, Cal.
Chief Engineer, Minerals Separation American Syndicate, Ltd.

Oliver, Edwin Letts .... 503 Market St., San Francisco, Cal.
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Packard, George A. .... Silver Bow Block, Butte, Mont.
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Page, William N..................1863 Kalorama Road, Washington, D. C.
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Parker, E. W......................................Washington, D. C.
Statistician, U. S. Geological Survey.
Parker, Richard A........................929 Foster Bldg., Denver, Colo.
Consulting Mining Engineer.
Parsons, Floyd W..........................505 Pearl St., New York City
Editor, *Coal Age.*
Patch, Maurice B...Buffalo, N. Y.
Supt., Buffalo Smelting Works.
Patterson, G. S............................Vivian, McDowell Co., W. Va.
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Payne, Henry M..............................50 Church St., New York
Chief of Staff, Stephen T. Williams & Staff.
Peele, Robert...New York City
Prof. of Mining, Columbia University.
Penrose, R. A. F., Jr....................460 Bullitt Bldg., Philadelphia, Pa.
Consulting Mining Geologist.
Perry, Oscar B...........................165 Broadway, New York City
Gen. Mgr., Yukon Gold Co.
Pomeroy, William A.....................600 W. 115th St., New York City
Asst. Mgr. of Mines, New Jersey Zinc Co.
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Pratt, Joseph H.....................................Chapel Hill, N. C.
State Geologist and Prof. of Geology, Univ. of North Carolina.
Prichard, William A...................c\|o Palo Alto Bank, Palo Alto, Cal.
Mining Engineer.
Pringle, Charles A.......c\|o Babicora Development Co., Madera, Chih., Mex.
Mining Engineer.
Pumpelly, Raphael......................................Newport, R. I.
Geologist.
Queneau, Augustin Leon Jean...........929 Chestnut St., Philadelphia, Pa.
Metallurgical Engineer, Wetherill Finished Castings Co.
Rainsford, Ralph S......................................Jackson, Cal.
Gen. Mgr., Argonaut Mining Co., and Golden Rule Mines Co.
Rawlings, Stuart L...........................San Dimas, Dgo., Mexico
Mgr., San Luis Mining Co.
Ray, F. A..Columbus, Ohio
Prof. of Mining Engineering, Ohio State University.
Read, Thomas Thornton...............420 Market St., San Francisco, Cal.
Associate Editor, *Mining and Scientific Press.*
Requa, M. L.......................1026 Crocker Bldg., San Francisco, Cal.
Mining Engineer.
Rice, George S.......................40th and Butler Sts., Pittsburg, Pa.
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Richards, Robert H......................................Boston, Mass.
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Rickard, Forbes.........................508 Equitable Bldg., Denver, Colo.
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Riter, George W............Deseret Nat. Bank Bldg., Salt Lake City, Utah
Sec'y and Mgr., Eureka Hill Mining Co.
Roberts, Milnor..........................University Sta., Seattle, Wash.
Professor of Mining Engineering and Metallurgy, University of Washington.
Robertson, William Fleet...........Department of Mines, Victoria, B. C.
Provincial Mineralogist of British Columbia.

Rogers, Allen H. . . . . . . 201 Devonshire St., Boston, Mass.
Consulting Mining Engineer.

Rohn, Oscar . . . . Butte, Mont.
Mining Engineer.

Sales, Reno H. . . . . . . Box 457, Butte, Mont.
Geologist for Amalgamated Copper Co.

Sanders, Richard H. . . . . . . 605 Drexel Bldg., Philadelphia, Pa.
Mining Engineer.

Schrader, F. C. . . . . . . Washington, D. C.
Geologist, U. S. Geological Survey.

Sharpless, F. F. . . . . . . 52 Broadway, New York City
Mining Engineer.

Shaw, Silas Frederick . . . . Charcas, S. L. P., Mex.
Supt., Mina Tiro General.

Shockley, W. H. . . . . . . No. 1 Queen Victoria St., London, E. C., England
Mining Engineer.

Sizer, F. L. . . . . . . Dos Cabezos, Ariz.
Gen. Supt., Mascot Copper Co.

Smith, Franklin W. . . . . . . Bisbee, Ariz.
Consulting Mining Engineer.

Smith, George Otis . . . . Washington, D. C.
Director U. S. Geological Survey.

Smith, William A. . . . . . . Herculaneum, Mo.
Mgr., St. Joseph Lead Co.

Smyth, H. L. . . . . . . Cambridge, Mass.
Prof. of Mining and Metallurgy, Harvard University.

Spaulding, M. B. . . . . . . Oliver Bldg., Pittsburgh, Pa.
Mgr., Pittsburgh District of Crocker-Wheeler Co.

Sperr, Frederick W. . . . . . . Houghton, Mich.
Prof. of Mining Engineering, Michigan College of Mines.

Spilsbury, E. G. . . . . . . 45 Broadway, New York City
Mining Engineer.

Spurr, J. E. . . . . . . 571 Bullitt Bldg., Philadelphia, Pa.
Vice-Pres., Tonopah Mining Co.

Starr, George W. . . . . . . Grass Valley, Cal.
Supt., Empire and Pennsylvania Mines.

Staunton, Wm. F. . . . . . . 609 Central Bldg., Los Angeles, Cal.
Consulting Mining Engineer.

Stone, George C. . . . . . . 55 Wall St., New York City
Chief Engineer, New Jersey Zinc Co.

Stonestreet, George D. . . . . . . Haileybury, Ont.
Consulting Mining Engineer.

Stoughton, Bradley . . . . 165 Broadway, New York City
Consulting Metallurgical Engineer.

Stow, Audley H. . . . . . . Pocahontas, Va.
Chief Engineer, Pocahontas Collieries Co.

Sussman, Otto . . . . 52 Broadway, New York City
Consulting Mining Engineer.

Symmes, Whitman . . . . Virginia City, Nev.
Supt., Mexican Gold & Silver Mining Co.

Thacher, Arthur . . . . Roe Bldg., St. Louis, Mo.
Mining Engineer.

Townsend, Arthur Rodman . . . . 25 Broad St., New York City
Consulting Mining Engineer.

Turner, Henry W. . . . . . . 62 London Wall, London, E. C., England
Mining Geologist.

Tyrrell, Joseph B........534 Confederation Life Chambers, Toronto, Ontario
Mining Geologist and Consulting Engineer.
Van Mater, Joseph A..........................55 Wall St., New York City
Manager of Mines, New Jersey Zinc Co.
Walker, Arthur L...New York City
Prof. of Metallurgy, Columbia University.
Washington, Henry S.......................Singer Bldg., New York City
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Waterman, Douglas ....Jocoro, Salvador, C. A.
Mgr., Gigante Mining Co.
Weed, Walter Harvey.........................42 Broadway, New York City
Consulting Mining Engineer.
Weeks, Francis D...............................52 Broadway, New York
Metallurgical Engineer, American Metal Co.
Welch, J. Cuthbert................................Box 248, Tooele, Utah
Metallurgical and Mining Engineer.
Westervelt, William Y.................17 Madison Sq. E., New York City
Mining Engineer.
Wethey, Arthur H.......................40 West 59th St., New York City
Mining Engineer.
White, Rush J..Wallace, Ida.
Supt. of Mines and Chief Engr., Federal Mining & Smelting Co.
White, Robeson T...Rancagua, Chile
Gen. Mgr., Braden Copper Co.
Wiard, Edward S........................417 Boston Bldg., Denver, Colo.
Mining Engineer.
Wilmot, H. C.................................. ...Aroroy, Masbate, P. I.
Care Colorado Mining Co.
Wilson, William A.................. ....Salt Lake City, Utah
Consulting Mining Engineer.
Winchell, Alexander N.....................................Madison, Wis.
Prof. of Geology, University of Wisconsin.
Winchell, H. V.........................505 Palace Bldg., Minneapolis, Minn.
Geologist.
Wright, Louis A...........................813 Mills Bldg., El Paso, Tex.
Consulting Mining Engineer.
Yeatman, Pope.................................165 Broadway, New York City
Mining Engineer.
Young, George J................................737 Center St., Reno, Nev.
Prof. of Mining and Metallurgy, Mackay School of Mines,
University of Nevada.

Total members............233

DECEASED MEMBERS.

Bettles, Alfred J.................................. ....Died Aug. 3, 1911
Blake, William P..Died May 22, 1910
Buckley, E. R...Died Jan. 19, 1912
Carpenter, Franklin R............................ ....Died April 1, 1910
Dudley, Charles B..Died Dec. 21, 1909
Emmons, Samuel Franklin................................Died Mar. 28, 1911
Forrester, Robert...Died Dec. 20, 1910
Lathrop, W. A...Died Apr. 12, 1912
Maynard, George W...Died Feb. 13, 1913
Shelby, Charles F...Died Jan. 25, 1911
Sutton, Linton B...Died June 11, 1911
Thompson, Heber S.............. ....Died Mar. 9, 1911

MEMBERSHIP GEOGRAPHICALLY ARRANGED.

ALASKA

TREADWELL

Kennedy, E. P.
Kinzie, R. A.

ARIZONA

BISBEE

Smith, F. W.

DOS CABEZOS

Sizer, F. L.

DOUGLAS

Douglas, J. S.

MIAMI

Gottsberger, B. B.

RAY

Cates, L. S.

CALIFORNIA

BERKELEY

Christy, S. B.
Cottrell, F. G.
Hersam, E. A.
Lawson, A. C.

GRASS VALLEY

Foote, A. DeW.
Starr, G. W.

JACKSON

Rainsford, R. S.

KENNETT

Metcalfe, G. W.

LOS ANGELES

Arnold, R.
Comstock, T. B.
Keith, F. A.
Merrill, F. J. H.
Mudd, S. W.
Staunton, W. F.

NEVADA CITY

Derby, C. C.

OAKLAND

Browne, R. E.

PALO ALTO

Clevenger, G. H.
Prichard, W. A.

PIEDMONT

Kimball, E. B.

SAN FRANCISCO

Bain, H. F.
Benjamin, E. H.
Bradley, F. W.
Bradley, P. R.
Brayton, C. C.
Bretherton, S. E.
Burch, A.
Butters, C.
Caetani, G.
Merrill, C. W.
Munro, C. H.
Noyes, W. S.
Nutter, E. H.
Oliver, E. L.
Read, T. T.
Requa, M. L.

SANTA BARBARA

Boutwell, J. M.

STANFORD UNIVERSITY

Branner, J. C.
Newsom, J. F.

WINTHROP

Keating, J. B.

COLORADO

DENVER

Argall, P.
Beeler, H. C.
Chase, C. A.
Chase, E. E.
Collins, G. E.
Dorr, J. V. N.
Farish, J. B.
Finch, J. W.
Morley, F. H.
Parker, R. A.
Rickard, F.
Wiard, E. S.

CONNECTICUT

NEW HAVEN

Irving, J. D.
McClelland, J. F.

IDAHO

GILMORE

Nichols, R.

KELLOGG

Easton, S. A.

WALLACE

White, R. J.

ILLINOIS

EVANSTON

Grant, U. S.

IOWA

DES MOINES

Keyes, C. R.

MARYLAND

BALTIMORE

Clark, W. B.

MASSACHUSETTS

BOSTON

Crosby, W. O.
Hofman, H. O.
Lindgren, W.
Richards, R. H.
Rogers, A. H.

CAMBRIDGE

Smyth, H. L.

MICHIGAN

CALUMET

MacNaughton, J. W.

HANCOCK

Lawton, C. L.

HOUGHTON

Cairns, F. I.
Sperr, F. W.

ISHPEMING

Duncan, M. M.

MARQUETTE

Jopling, J. E.

VULCAN

Kelly, W.

MINNESOTA

DULUTH

Merriam, W. N.

MINNEAPOLIS

Appleby, W. R.
Winchell, H. V.

MISSOURI

HERCULANEUM

Smith, W. A.

KANSAS CITY

Malcolmson, J. W.

ST. LOUIS

Kirby, E. B.
Moore, P. N.
Potter, W. B.
Thacher, A.

MONTANA

BUTTE

Goodale, C. W.
Packard, G. A.
Rohn, O.
Sales, R. H.

NEVADA

RENO

Young, G. J.

VIRGINIA CITY

Symmes, W.

WONDER

Burgess, J. A.

NEW JERSEY

FRANKLIN FURNACE

Catlin, R. M.

SEWAREN

Cowles, A. H.

NEW YORK

BUFFALO

Patch, M. B.

NEW YORK

Aldridge, W. H.
Allen, J. H.
Ball, S. H.
Channing, J. P.
Clark, C. D.
Clements, J. M.
Corning, C. R.
Cox, W. R.
Dufourcq, E. L.
Dwight, A. S.
Eurich, E. F.
Finlay, J. R.
Hoover, H. C.
Huntoon, L. D.
Ingalls, W. R.
Jennings, S. J.
Kemp, J. F.
Knox, H. H.
Lawrence, B. B.
Leggett, T. H.
Lewis, J. V.
Mein, W. W.
Mercer, J. W.
Munroe, H. S.
Parsons, F. W.
Payne, H. M.
Peele, R.
Perry, O. B.
Pomeroy, W. A.
Riordan, D. M.
Sharpless, F. F.
Spilsbury, E. G.
Stone, G. C.
Stoughton, B.
Sussman, O.
Townsend, A. R.
Van Mater, J. A.
Walker, A. L.
Washington, H. S.
Weed, W. H.
Weeks, F. D.
Westervelt, W. Y.
Wethey, A. H.
Yeatman, P.

NORTH CAROLINA

CHAPEL HILL

Cobb, C.
Pratt, J. H.

OHIO

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